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A

COMPARATIVE ESTIMATE

OF THE

MINERAL AND MOSAICAL

GEOLOGIES.

REVISED, AND ENLARGED WITH RELATION TO THE
LATEST PUBLICATIONS ON GEOLOGY.

ΣΥΜΦΩΝΟΝ ΔΕΙΞΑΙ ΤΟΙΣ ΦΑΙΝΟΜΕΝΟΙΣ ΤΗΝ ΤΟΥ ΘΕΣΠΕΣΙΟΥ
ΜΩΣΕΩΣ ΚΟΣΜΟΓΕΝΕΙΑΝ.

Philoponus, *ap.* Photium.

By GRANVILLE PENN, Esq.

IN TWO VOLUMES.

VOL. I.

SECOND EDITION.

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M.DCCC.XXV.

" Singulare remedium antidotumque exhibet PHILOSOPHIA contra " infidelitatem et errores. Nam Salvator noster inquit, ' *Erratis* ' *nescientes* SCRIPTURAS *et* POTENTIAM DEI.' Ubi *duos libros*, ne " in errores incidamus, proponit nobis evolvendos: primo, VOLUMEN " SCRIPTURARUM, quæ voluntatem Dei, dein, VOLUMEN CREATURARUM, " quæ potentiam revelant."

BACON, DE AUGMENT. SCIENT. lib. i. tom. iv. p. 40.

PREFACE

TO

THE FIRST EDITION.

I AM sensible that the first use which I ought to make of this preface, is to apologise for troubling the world again, so soon after submitting to its judgment my observations on *The Primary Argument of the Iliad.* The best apology which I can offer, is the assurance, that neither of these tracts has been newly or hastily taken into hand; but, that they have lain by me for many years, and have been occasionally revised, extended, or curtailed, according as later materials have fallen in my way.

When Varro published his treatise upon *Agriculture,* he alleged; " *annus octogesimus* " *admonet me, ut sarcinas colligam antequam* " *proficiscar de vita.*" No one of common sense, will wait in the expectation of such a monitor. Short of the term of the vivacious Varro, every reflecting person will be sensible of a period, in which it is prudent to begin *sarcinas colligere.* This motive has induced me to allow treatises, upon subjects so widely different, to follow each other so soon; and I request, that the same motive may be favourably received as a general apology, should the present tract not be the last thus adventurously put forward.

With respect to the *argument* of the present work, it is my wish not to anticipate it in a preface; but, to leave it to unfold itself to the reader in the perusal. I shall, therefore, only briefly and summarily state; that the FIRST and SECOND PARTS treat, separately, of *the* MODE *of the* FIRST FORMATIONS *of the Earth,* according to the *Mineral,* and the *Mosaical*

Geologies; and, that the THIRD PART considers *the* MODE *of the* CHANGES *or* REVOLUTIONS *which the Earth has undergone,* according to *both* Geologies.

The *results* of these several investigations, will be found combined in the *Conclusion,* with which the treatise is terminated.

I have endeavoured, by keeping the thread of the argument simple and compressed, to avoid all superfluous dilatation and digression; in which endeavour, I hope I shall be found to have succeeded. It was originally designed, and it has been solely prepared, for such *earnest* and *sincere* inquirers as are anxious to relieve their minds from *perplexity,* or to disengage them from *error,* in the high and important subjects of which it treats; and who are willing to *advance in the prosecution of the truth respecting them,* as far as the *principles of that truth,* actively pursued, are *capable of conducting them.* Such *advance* is entirely frustrated by the practice which, in similar discussions, has too frequently prevailed, of maintaining a constant skirmish with cavillers and sophists; whose policy it is, to challenge a perpetual warfare *on the road,* in order that it may *not be travelled to the* END. By yielding ourselves to that stratagem, we contribute in effect to promote one great end of infidelity. Whereas, if we will only *resolutely set forward,* and pursue our progress uninterruptedly under the safeguard of *a sound and powerful principle,* we may set all adversaries at defiance; and, by pressing on to the utmost extent to which that principle will lead us, we shall at length arrive at *the term* from which it was the design of the adversary to preclude us. It is a weak system of tactics, which, in an enterprise of great moment, would stop to engage with every hovering band that attempts to harass the march; whilst, at the same time, there exists *a consciousness of force sufficient to accomplish the enterprise in spite of all opposition.*

To those among the opponents who cherish *a general regard for truth,* and many such there are, the manifestation of the *Sacred Truth* which we shall have gained in their despite, will operate with advantage; and they themselves will thus become benefited, by the resolution with which their arms shall have been slighted and their opposition disregarded. With respect to all other opponents; as we cannot entertain an hope of serving them by our success, so neither shall we suffer ourselves to be interrupted by their opposition: —*obturatâ aure transibimus.*

INTRODUCTION

TO

THE PRESENT EDITION.

SHORTLY after the publication of the first Edition of the *Comparative Estimate,* several very important works on Geology appeared in quick succession before the world; *viz.*

The first Volume of the *Geology of England and Wales,* with the *Introduction* of the Rev. W. D. CONYBEARE.

Mr. Professor BUCKLAND's *Reliquiæ Diluvianæ.*

M. CUVIER's *Ossemens Fossiles.* New Edition.

The Translation of M. HUMBOLDT's *Geognostical Essay on the Superposition of Rocks in both Hemispheres.*

The Edinburgh and Quarterly Reviews of the *Reliquiæ Diluvianæ.*

To these may be added, the *Geological Disquisition* introduced by the Rev. G. S. FABER into his *Treatise on the Three Dispensations.*

Also, the reviews of this present Work, in the *Eclectic Review,* in the *Journal of Science,* and lastly, in the *British Critic.*

The important matters which the former of those works contained, could not therefore have been noticed in the first edition of this treatise; and consequently, in revising and preparing it for a second edition, it became necessary to dissolve and recast the whole, in order to bring it into immediate relation and contact with each of those several publications. In the progress of that operation, I found it expedient to develope more extensively many particular passages of my argument, and to subjoin to the work some dissertatory Notes; by which various modes of augmentation, notwithstanding the curtailment of several redundancies, the treatise has unavoidably grown from one into two volumes.

I am very far from regretting this circumstance; it has enabled me to form a more secure judgment of the quality of the argument which I at first undertook to maintain, and it has rendered less intricate the course which I have now to pursue in order to demonstrate and establish its solidity. I have found no cause whatever, for mistrusting the line of reasoning which I employed in the first instance; and I am now to shew, that it is in no manner impaired by any thing which has been brought forward in any of those later works, but that, on the contrary, it derives the strongest and most effectual collateral support from all and each of them. This will be made thoroughly to appear, in the progress of the subject; either by extensions of the text, or by marginal notes, according as the particular occasion may be found to require.

With respect to the *Notes* annexed to each volume, in the form of an *Appendix*:—To the First Volume are subjoined;

Note I. *On the Mosaic Days of Creation.*
II. *On the Jubilean Chronology of* FRANK.
III. *On* M. HUMBOLDT'S *Theory of Rocks.*

In the Second Volume, I have preserved in their separate form, as a *Supplement* to Chap. VI. Part III., all those particular observations relative to *Caves in limestone-formations, containing Fossil Animal Exuviæ,* which could not have been incorporated into that chapter without disproportionately enlarging it, and thereby encumbering the direct thread of the general argument. These observations are followed, by

Note IV. *On the numerous Revolutions of* M. Cuvier.
V. *On the recent discovery of Fossil Human Remains at Durfort and Kösritz.*
VI. *On the Eastern Origination of Mankind.*

In quoting from M. Cuvier, wherever minuteness was required, I have translated the cited passages from the last edition of his work; where the argument was general, I have made use of the translation of Professor Jameson, in the edition published at New York by Professor Mitchill, in 1818.

Having summarily stated these several particulars, respecting the present Edition; I shall now employ this *Introduction,* in examining certain general principles which have been propounded, and certain particular opinions which have been advanced, contrary to the principles which constitute the groundwork of the *Comparative Estimate.*

1. It is one of the wonders of Revelation, that it discloses new, and as it were contingent evidences of its *truth,* at different succeeding periods, as *Time* advances in its course. The *Revival of Learning,* unfolded and multiplied new and irresistible *moral evidences* of that *truth*

fifteen centuries after its first divulgation to the nations of Europe, among whom it was ordained to be planted; and, the progress of *Scientific Research,* especially in this our own extraordinary age, has unfolded and multiplied new and irresistible *physical evidences* of the same: so justly has it been remarked, that " the *evidences of Religion* " have advanced with the progress of *true philosophy;* " and that *Science,* while she raises a monument to *her-* " *self,* at the same time erects an altar to the DEITY[1]." Those successive apparent *contingencies,* are not *accidental;* they constitute *reserved parts* in the mysterious scheme of the great Dispensation which is now in actual and irresistible progress, and, by which, the *Truth* of that which God has been pleased to reveal to Man will be triumphantly upheld and continually increased in lustre, until the END shall arrive in order to which it was at first imparted. The science of GEOLOGY, the last of those *reserved measures of light* which have been opened upon us, has this remarkable character above all the preceding physical sciences; that, it not only conducts the intelligence, like them, to the discernment of the *God of Nature,* but advances it further, to a distinct recognition of that *God of Nature* in the *God of Scripture.*

2. The learned and able Edinburgh Reviewer of the *Reliquiæ Diluvianæ,* questions " the *prudence* of attempt- " ing to connect the *discoveries* of natural science with the " sacred *writings;*" and he is " by no means certain, that " it would not be *better* to leave altogether untouched the " *connexion of Geology with the Sacred Narrative*[2]*:*" and

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[1] BRANDE, *Outlines of Geology,* pag. ult. 1817.

[2] No. lxxvii. Oct. 1823, p. 198.

my Reviewer in the British Critic, also, "has always "doubted the expediency of connecting the speculations "of Science with the truths of Revealed Religion." This curious principle, here conveyed in the form of a *doubt,* is one of the most extraordinary doctrines that could have been proposed to the intelligence of the existing generation of Christians; it is, therefore, of the utmost importance that it should be stripped of its character of *a doubt,* and that it should be rigorously examined in its tangible character of a *positive proposition.* It will then stand thus:—"it is imprudent and inexpedient to endeavour to connect the *discoveries* of natural science in "*Geology,* with the *statements* of the Sacred Narrative "relative to the *formation and changes of the Earth.*" Now, besides the unreasonableness immediately manifest on the face of this proposition, provided we admit that Narrative to be *authentic* and *sacred,* and do not mistrust its communications; every clear-sighted intellect that will only take the pains to look steadily upon it, and to trace it to its inevitable issue, must perceive; that, if it be rendered absolute and universal, and without any consideration of *what those discoveries in natural science may have brought to light,* it may eventually terminate in this preposterous and absurd conclusion:—that "it is *imprudent* "*and inexpedient* to investigate the *most direct and imme-* "*diate proofs,* that the God of Nature and the God of "Scripture are *One and the Same.*" To trace that *unity and identity,* is the sole object in seeking the *connexion;* and therefore, to inculcate, *unconditionally,* the imprudence and inexpediency of seeking it, is, in effect, to endeavour to frustrate or obstruct the *most direct discernment* of that unity and identity.

3. I am of course aware, that the backwardness from engaging in this pursuit, has, in many instances, proceeded from a *fear* that the connexion might not be found practicable; and from a further *fear*, of the *consequence* that might result from a demonstration of its impracticability; and, in the ages of defective physical knowledge which are past, such fear had a ground in *reason*, and might therefore claim a character of *prudence*. During those ages, therefore, faith found its firm ground in *moral evidences* only. But, that is no longer the case with us, at the present day. In corroboration of those *moral evidences*, a "cloud of *physical witnesses*"—νεφος μαρτυρων, has recently and almost suddenly burst upon the world. In the unfolding plans of that Providence which watches over and directs the course of intellectual light within the pale of Revelation, we have now reached a term, which takes from that fear all its quality of *prudence;* and leaves it no other than that which simple "*fear*" has long since been defined to be—"*a betraying of the succours which* "*reason offers*[1]." Those *new succours*, totally alter the quality of that *fear*. In truth, *Physical Science* has not worked more effectually to any other end, than it has been caused to work effectually, though unconsciously and unintentionally, for the discovery and manifestation of those *connecting evidences* which *shew* the God of Nature and the God of Scripture to be *One and the Same;* and, the age in which we are living, is that which has brought this progressively increasing light to its broad day, nay, to the point of its meridian. As, therefore, the qualities of all actions vary with their circumstances, so also does

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[1] Wisdom, xvii. 12.

the *prudence* of abstaining from seeking a connexion between *Geology* and the *Sacred Narrative;* and, the reason which before rendered the abstinence prudent, having ceased, and being succeeded by an imperious reason for pursuing the research, the prosecution of it is no longer either *imprudent* or *inexpedient*.

4. Of the *person* of the God of Nature, we know nothing but from the God of Scripture; and, the God of Scripture has been careful to impress upon our minds, that He is also the God of Nature; to pursue the *evidence of that identity*, is therefore only to follow the direction of that impression. If the God of Scripture has declared certain primeval events and operations to have taken place in this Globe, to which the God of Nature only could have been privy, and, if those events and operations are now at length *discovered* to be unequivocally attested by *physical monuments universally existent and incorporated in the globe;* then, the God of Scripture and the God of Nature are *seen* to be *One and the Same*. I ask no leave of the *Philosophers* or *Eczetics*, of whatever description, to draw this positive conclusion; the conclusion, is an *item* of eternal and immutable *Truth*, and the argument is anterior, in *reason*, to all the inventive speculations of a *Mineral Geology*.

5. Now, *if* that God of Scripture and of Nature has been pleased to impart to us a communication of any *historical facts* concerning the Globe which He created, relating either to its *formation, ordination*, or *alteration*;—*if* He has specifically informed us, that, when He first created it, He caused its universal surface to be *covered by the mass of the ocean;* that, by an immediate operation, He caused all that ocean to be drawn down, reduced, and

collected within *a part only* of that surface, leaving the *other part dry;* that, at a later period, He caused all that dry part, with its inhabitants and productions, to be *destroyed by a refusion of the ocean upon it;* and, that the part of the globe, or *earth,* which man now occupies, is *not the same part,* or *earth,* which man originally occupied;—*if* He has been pleased to communicate to us these great and paramount facts, and, *if* the Earth is seen to abound, universally, with monuments corresponding directly and intimately with those several communications; what are we to think of a *Doctrine* which would inculcate, that we are *not to connect* those communicated facts with the *Science of the Earth,* or *Geology?* or, of a *Geology,* that would attempt to establish itself at all, in total exclusion or rejection of them: although they reveal so manifest a relation to the results of its own researches, which have caused it to view the constituent materials of the Globe as dividing themselves, sensibly, into *four* corresponding *general classes* of mineral formations; for which *four classes,* and for *their differences,* there must have existed as many different and distinct *causes?* "That "*some such* general laws—as a successive *order* or "*arrangement* in the rock formations of the globe in "general—should actually be discovered, is (says this "geology) what we think *might have been expected à "priori* from the *uniformity* which is, in other respects, "observable in the mineral kingdom[1]." But, the *problem* which is of most immediate importance to the intelligence, and which it cannot solve by any *à priori* principle with which it is supplied, is—the *uniformity of* DISORDER

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[1] *Ed. Review,* vol. xxix. p. 72.

and DERANGEMENT, manifest in that "*uniformity of* "ORDER *and* ARRANGEMENT which it thinks it might "have expected *à priori*."

6. Whether those great paramount facts are really imparted to us, is a question to be tried and proved in the following work; I here only state them hypothetically, in order for common sense to judge, what weight they must have, if *true*, or even if supported by powerful moral and physical *probability*, in the *Science of the Earth;* and, what must be the nature of that *prudence*, which would banish them altogether from that science, and would strive to prevent the understanding from taking any cognizance of them, even so far as to scrutinise the evidences by which they are sustained? For, *common sense* cannot fail to discern, that they are as probable *à priori*, as any thing that the versatility of geological invention has *devised* or *proposed* in opposition to them; even without taking into account, the authority of the testimony by which they are certified.

7. If there is any thing that tends more than another to perplex the thoughts of the believer in Revelation in this age of geological inquisition, it is unquestionably the objects with which he sees himself surrounded in the disordered scenery of the globe, when he is urged to contemplate them as they are adventurously expounded by persons who resist all *connexion* of them with the narrative of Scripture; and when, moreover, their expositions are dogmatically asserted, to be the proper dictates of *philosophy*. And, as the exposition of those objects has hitherto been almost exclusively adventured by persons who have systematically *resisted that connexion*, a reflecting mind is bewildered by the difficulty of recon-

ciling the Author of the objects which are *seen*, with the Author of the statements which are *read;* and seems often driven near to the distracting doubt, whether they can be *One and the Same,* and consequently, whether the first and introductory record of the body of *Scripture* can be truly of *divine original:* for, we are sure, that *Nature* is of *divine original.* To trace their *connexion,* is therefore of the first importance, in Man's relation to God *under Divine Revelation.*

8. A valuable reverend writer on Geology, whose scientific work appeared a few months after the publication of the first edition of the *Comparative Estimate,* has declared his inclination to adhere to that prudential reserve, which would still avoid an intimate connexion of *physical phenomena* with the *record of Scripture;* and he appears to regard every attempt to *prove the connexion,* as an "*injudicious interference of advocacy*[1]." As his motive is entitled to the greatest attention, and as his volume is now become a text-book in the hand of the geological student, it is of the greatest importance, that the grounds alleged by him for the *dissociation* which he inculcates, should receive a full and a particular examination. Those grounds are laid, in the two following propositions:

First, "That the *professed object* of Revelation, was to "treat of the *history of man only;* and that, *even but as* "*far* as affects his relation to his Creator."

Secondly, "That to have made *physical truth generally* "the subject of Revelation, would have been to destroy its "great use, namely, that its investigation might form at "once the most delightful resource and the most in-

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[1] *Introduction* to Geol. of England and Wales, p. lviii. *note.*

"vigorating exercise of the *powers of reason*, bestowed "upon us as our distinguishing prerogative[1]."

9. But, those two propositions are introduced by the following extraordinary *axiom*: "*Before* we examine the "bearings of physical science on Revelation, *our ideas* "*should be first settled* as to what *may be reasonably* "*expected from Revelation* in this respect[2]."

I must, *in limine*, resist this most dangerous and unconsidered principle; which, if it be true in the present subject, must be equally true in every other subject for which Revelation is asserted. It propounds, that man's *expectations*, formed by the indefinite and insecure rule of what *he may deem reasonable for Revelation to have imparted*, constitutes the test of what *has been really imparted by Revelation*; consequently, whatever may be *contrary to those expectations*, cannot have been revealed by God. Such, is the inevitable issue of the principle. Now, it is most certain, that in "settling our ideas" *à priori* on this great point, it may very possibly, nay, very probably happen, that we may *settle them quite wrong*; for, God may have actually revealed that, which man might not have *expected* that God would have revealed, and which he might not have thought it *at all reasonable to expect* that God would have revealed; and so, the *real* bearing of physical science on Revelation, may be in *direct opposition* to what man may have deemed *most reasonable to expect*. It is not by any *à priori* reasoning, that the human intellect is capable of ascertaining what is *reasonable* for God to have revealed; for, "*who hath known the mind of the Lord, or who hath been*

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[1] *Introduction* to Geol. of England and Wales, p. l. li. [2] Ib. p. l.

"*His counsellor*[1]?" It is, by *à posteriori* reasoning only. Whatever God shall be *found to have revealed*, is *reasonably* revealed, because it is *His revelation*:—"*Dei* "*sermo, sermo rationis*[2]." There is no method for truly ascertaining this point, as it relates to the circumstances of our Earth, but by comparing the *declarations* of Revelation with the *discoveries* of science; and it is by the *correspondences* of these only, that the bearing of physical science on Revelation can be truly determined. So long as the *physical evidences* were unapparent, the mind rested, in full and entire security, on the *moral evidences*. But, when *physical evidences* are at length disclosed and superadded, in collateral confirmation of the moral evidences, the intelligence is not free to disregard them, but is bound, by virtue of its "*prerogative of reason*," to contemplate them in combination with the moral evidences which they are manifested to corroborate. If, we correctly ascertain *à posteriori* what *is revealed*, and if we accurately compare with it what *is discovered*, then we cannot fail to perceive clearly, how far the *discovery* bears upon the *revelation*. I shall now proceed to consider the learned and scientific author's *two propositions*.

10. With respect to the first of these, that "the *pro*- "*fessed object* of Revelation was to treat of the history of "*man only*;" I would respectfully ask the reverend writer, what said the Creator when He enforced the observance of His seventh day on the Hebrew people? "In "six days the Lord created the *Heaven*, and the *Earth*, "the *Sea*, and *all* that in them is, and rested the seventh "day; *Wherefore* the Lord blessed the seventh day, and

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[1] Rom. xi. 34. [2] TERTULLIAN, *de Oratione*, in princip.

"sanctified it[1]." Here is no mention of *man*, still less of "*man only*." The knowledge of man's relation to his Creator, is thus laid, by God Himself, on man's knowledge of God's relation to the universe in all its separate constituent members; of His exclusive property and operation in it; and of the part which He took in forming and disposing every member of it. The knowledge of man's own origin, without an equal knowledge of the origin of the whole visible creation around him, would have left him essentially deficient in the knowledge of his Creator; and therefore, God was pleased to impart to him special and particular *historical knowledge*, of the origin of the Heavenly bodies which enlightened and directed him, of the Earth on which he dwelt, of the Sea which encompassed that earth, and of the Vegetable and Animal structures which clothed and inhabited its surface, *before He imparted to him the history of his own origin.* The history of the origin and relations of all and each of these, is therefore as much a *professed object of Revelation*, as the history of the origin and relations of *Man himself.* And, here it will be most material to point out for attention, discrimination, and reflection, that the *formation of the Sea*, throughout both Testaments, is an operation specially vindicated to the Divine arm, as a subject equally distinct from the formation of the *Earth*, as that of the Earth from that of the *Heaven*[2]; conformably to the primitive historical statement of that formation, imparted by God through Moses. Jerom, therefore, certainly made a more correct statement of the contents of the Record, when he affirmed—" that the Book of " Genesis treats, of the *nature of the world*, of the beginning of the human race, of the division of the earth, " of the confusion of languages and nations, until the " Exode of the Hebrews.—Manifestissima est Genesis, in " qua *de natura mundi*, de exordio generis humani, de " divisione terræ, de confusione linguarum et gentium, " usque ad exitum scribitur Hebræorum[1]."

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[1] Exodus, xx. 11.

[2] "Thou, even Thou art Lord alone; Thou hast made—HEAVEN, the "HEAVEN OF HEAVENS, with all their host—the EARTH, and all things "that are therein—the SEA, and all that is therein: and Thou pre"servest them all." (Nehemiah, ix. 6.)—"Whatsoever the Lord "pleased, that did He in HEAVEN, and in EARTH, in the SEA, and in "all DEEP PLACES." Psalm cxxxv. 6.

11. Again, if " the dealings of Divine Providence in " regard to man" were also a professed object of Revelation, as this author admits[2], a knowledge of the *Divine judgments* on the universal race of man, was necessarily included in that object; which *judgments*, embrace the *universal infertility* of the earth that received the first generations of men, and the *universal destruction* of that earth by the waters of the Deluge. And thus, the history, both of the *origin* and *formation* of the earth and its appurtenances, and of the *universal changes* which it has undergone, are embraced within the *professed scope* of Divine Revelation. And, because they are presented for our *knowledge*, they are unquestionably presented for the *diligent exercise, and faithful apprehension, of our intelligence*. That, therefore, is *virtually declared* to us, which results to our implanted intelligence by *immediate consequence* from that which is *expressly declared*. Thus, when it is expressly declared, that on the fourth day the sun gave its light upon the earth; it is *virtually declared* under the laws of *Creation*, which are the laws of *Nature*,

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[1] *Epist. ad* PAULINUM, tom. iv. p. 571. Ed. Benedict.

[2] *Introduction* to Geol. of England and Wales, p. l.

that the earth and its vegetation then received the warmth of its beams, that the azure sky was then apparent, that hills and trees then cast their shadows, &c. When it is expressly declared, that on the fifth and sixth days feathered fowl and cattle received their existence, it is virtually declared, that birds then flew in the air from place to place, and that animals then moved and grazed on the surface of the ground; although "we are not *told* "*so*:" a condition, which a modern Critic appears to deem indispensably necessary for every step which his reason may venture to take[1]. Again, when it is expressly declared, that waters which at first had covered and concealed the *entire surface* of the Globe, were, on the third day, collected *into one place* or portion of that surface, so as to leave the other portion dry and apparent; it is virtually declared, under the same laws, that those waters were then *admitted into*, and *sunk within* that place or portion, below the portion which they had abandoned and left dry. When it is expressly declared, that that dry portion was afterwards destroyed by the waters of the sea brought again upon it, it is virtually declared, that a *partial refusion*, at least, or *return* of its waters, then took place; and, when it is further expressly declared, that the land "*which now is*," is not that same dry portion "*which* "*then was*," it is virtually declared, with the concurring testimony of marine monuments universally incorporated into the substance of this present land, that the *refusion* or *return* of the waters was *complete*. And, when we have once apprehended the last of these amazing transactions, thus virtually declared and palpably attested; transactions, which human science could never have discovered or devised; it is not short of ludicrous to observe the perplexities of those who search, in vain, in all the storehouses of theory and invention, for *water enough to cover the earth,* and who entirely overlook Him who only "*calleth for the waters of the Sea, and poureth them out upon the face of the Earth*[1]." Who shall say, that it was *not reasonable* for God to impart these great events to His *reasonable creature,* MAN? And yet, they would never have entered into man's *most reasonable expectations* of what God might impart by revelation. These vast *data,* supplied *from without* by irrefragable testimony, constitute a basis for geological and mineralogical superstructure, infinitely surpassing in solidity and security any thing that has been or can be drawn, by *theoretical invention,* from within the precincts of any human mind; and, far from giving any cause of "*dread* to the delightful study of *geology,* or rendering its very name *ridiculous*[2]," it is these that can alone relieve it, both from all *dread* of error, and from the *ridicule* which must eventually attend all attempts to raise an edifice on *vacuity,* or on a foundation utterly and essentially incapable of sustaining it.

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[1] See afterwards.

12. I come now to our learned author's second proposition; that, to have made "*physical truth generally,*"—or, as he explains his meaning more clearly six lines before, "*a* SYSTEM *of physical truth,*" the subject of Revelation, would have been to destroy its (physical truth's) great use. This able writer, like all others who have too hastily embraced the same opinions, argues, as if no *physical* FACTS could be imparted to man by revelation

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[1] Amos, ix. 6.

[2] *Edin. Review,* No. lxxvii. p. 196.

without being accompanied, at the same time, with *a* SYSTEM *of physics.* No *system of physics,* is imparted to us; but, *fundamental physical facts* are most certainly imparted to us, in order that we may have a *secure and certain basis* on which to found the *system* which, by the due exercise of our intelligence, we may construct, and which could, otherwise, never have acquired any secure and certain basis at all. Our *reason* is, indeed, to work; but, it is set *right* in the first instance, that it might not necessarily work *wrong.* We have, therefore, *no physical system,* but, we have *grounding physical facts.* "There "is no *Royal Road* to Geology, (says a very able "Journalist)—neither do we know of any science in "which the reasoning is of a *more difficult nature,* par-"taking, in some measure, of that demonstration which "rests on *physical* evidence, but often also dependent on "the far more difficult logic which belongs to *moral* "evidence, to comparison of probabilities, to abstruse "inferences, and to deductions drawn from analogies in "the other departments of physical science[1]." It is exactly in the inextricable foldings of this fearful labyrinth, that the infinite value of those simple *grounding principles* which the Mosaical revelation alone either does or can supply, clearly manifests itself; by opening to us a *Royal Road of Rudiments* which conducts us securely through the *first* arduous difficulty, unsurmountable by man's ability alone, of finding the *true foundation* on which the *historical science of Geology* must ultimately rest.

13. Relying, however, on the security of his own

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[1] *Edin. Review,* May 1823, p. 414.

proposition, our animated author proceeds to deduce, from his alleged *concealment* of those high matters, the savour which gives to physical research its peculiar relish; and he asks —" Who would willingly exchange " that *play of mind* which the task of *invention* affords, " for a system which should leave *no other province to* " *reason beyond learning that which was already plainly* " *recorded?* Did it not carry us beyond our limits, it " would be easy to shew, how much of the *interest of* " *science* arises from the former cause; and that, not only " in the minds of the few who are gifted to achieve " original discoveries, but of the many who, in following " their steps, '*pursue the triumph and partake the gale.*' " How little comparative *curiosity* should we feel con- " cerning the course of the Niger or the northern coast " of America, could they be as easily examined as the " Thames and the Channel[1]!" Surely this respected writer cannot have reflected upon the principle which he thus poetically propounds, and which directly and expressly inculcates, that the gratification of the *reason,* is in inverse proportion to the possession of the *truth:* so that, where there is a narrower field for the mind to exercise the *play of invention,* there the *province of reason* must be proportionately reduced in the measure of enjoyment. What then becomes of the high and supreme delight arising from the presence of *truth itself,* which precludes all *play of invention;* and, which Cicero pronounced to be the ultimate object of appetite to the human mind? Has our " distinguishing prerogative of reason" *no province* to stimulate and savour its exercise, in things that are *already*

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[1] *Introduction* to Geol. of England and Wales, p. li.

plainly recorded? The enjoyment of *invention,* in science and philosophy, is then only legitimate, when, unable to attain the *verum,* it has attained the *verisimile;* and, the enjoyment is derived, not from any playful exercise of thought, but solely from the *resemblance of truth* which is discerned, and which inspires a well-founded hope of the propinquity of truth itself. Shall we then say, that it is derived from the remaining distance of the truth; and, that it would cease with the occurrence of the truth plainly revealing and recording that which was at first sought by *invention?* That it is only to be experienced so long as we "*look through a glass darkly,*" which leaves us a *field for invention?* Who would *not* willingly exchange such play of mind for a system so plainly recorded, as should supersede and render impertinent all the frolics of *invention?* The play of the mind in invention, is most commonly like the play of a grampus on a shoal, which plays and flounders because it cannot make progress. That mental play is illegitimate, which can only be enjoyed by keeping short of the full illumination of the truth; and yet, such is the enjoyment inadvertently and unintentionally eulogised in the *terms* of the principle advanced by this instructive mineralogist; and which is directly at variance with his own better considered judgment, which condemns "the impatience of those who avail themselves "of the *immature* results of an imperfect knowledge, (that "is, who *invent,*) opposed as it is in every respect to the "persevering and reflective spirit of inquiry which marks "*genuine philosophy,* and can alone lead to the *ultimate* "*attainment of truth*[1]." This, is his *real opinion;* and therefore, he could never have meant to inculcate that which the *terms* of his proposition, nevertheless, incautiously convey to the geological student; or, that we do not feel as much *real* enjoyment in expatiating on the banks of the Thames, as we feel *speculative* enjoyment in conjecturing of those of the Niger; or, that the *interests of science* would cease, as soon as the *appetite of curiosity* should be satisfied with respect to the course of the latter river. The truth is, that in the passage which I have cited, the "*interests of science*" are accidentally involved with the incitement of "*curiosity*;" and, the *same conclusion* is incautiously and precipitately drawn to *both*.

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[1] *Introduction* to Geol. of England and Wales, p. xlix.

14. "It does *not seem inconsistent* with the authority "of the sacred historian (proceeds this author) to *suppose*, "that, after recording in the first sentence of Genesis the "fundamental fact of the original formation of all things "by the will of an Intelligent Creator, he *may pass, sub* "*silentio*, some intermediate state whose ruins formed *the* "CHAOTIC MASS *he proceeds to describe*, and out of "which, *according to his further narrative*, the present "order of our portion of the universe *was educed*[1]." I must leave to the First and Second Parts of the following work to shew, demonstratively, that such a *chaotic mass*, and such an *eduction from it*, as are here and elsewhere assumed, are not only *not described* by the sacred historian, but are absolutely *inadmissible* by the principles either of *his history* or of *our reason*; and therefore, that it would be *totally inconsistent* to assume, or to suppose, that the historian has *passed* any part of them *sub silentio*, which

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[1] *Introduction* to Geol. of England and Wales, p. lx.

would be only to insist hypothetically upon those inventive articles, against the evidence which fundamentally disproves them. It is a most dangerous adventure of the *invention*, to attempt to *confirm* an hypothesis of unattested facts, by the *total silence* of the historian who alone could have attested them[1].

15. “ The general *connexion* of physical science (con“ tinues the same writer,) will be rather with *natural* “ than *revealed* religion; for, in the former, the *great* “ *problem* will be, to *trace the Author of Nature in* “ *His works*—thus, the connexion is *essential*. But, “ that with *revelation* is *incidental only*, and confined to “ such facts as *happen to be mentioned* in relation to the “ providential history of man, its great object[2].” This reasoning, is a natural offspring of the *separating principle* which I oppose. But, I apprehend, that the “ *great* “ *problem*” for those who live under *Revelation*, will rather be to trace the *Author of Scripture* in the *Works of Nature*. It is far beneath a *Christian* to be always “ *laying again the foundation*[3],” by accumulating a glut of evidences *that nature has an Author:* a fact, so abundantly proved to the human reason, that the Apostle affirmed it to be “ *known*”—γνωστον—even to the heathen world, and he pronounced that world “ *inexcusable*”—αναπολογητος, for not acting in conformity to that *knowledge*. The *Christian's* object is, assuredly, to multiply the evidences which shew, that that Author, so amply manifested by His *Works*, is the Author also of the *Inscribed Truths* on which he rests for light, for consolation, and for

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[1] See p. 296 of this Volume, *note* 2.

[2] *Introduction* to Geol. of England and Wales, p. 51.

[3] Heb. vi. 1.

hope. Those *uniting evidences* our respected author calls "*incidental only*," and he views them as "not contributing *much additional support* to the truth of the Mosaic record[1]." But, if they exist at all, (and they do exist,) we may be perfectly sure that they are not "*incidental only*," but "*essential*;" and, that the fundamental facts which "*happen to be mentioned*," will not have been mentioned by *Chance* but by *Providence*, and will, therefore, as they were designed, contribute MUCH *additional support* to the truth of the Mosaic record.

16. I am perfectly well aware, that all this is entirely new language to *Physical Science* in general; but, the Physical Science of *Christendom* stands urgently in need of hearing this new language. It has long "*called darkness light, and light darkness*;" and, in some cases intentionally, in other cases unconsciously, it has persisted in *playing the cards of infidelity*, as will be abundantly manifested in the progress of the following treatise. But, the long period of its competition with the authority of Revelation has reached its term; and, as the *rod of Aaron* consumed the competing rods of the magicians, and confounded the *Sophists* of Egypt—τους σοφιστας της Αιγυπτου (LXX.); so the *pen of Moses*, of which the former may be regarded as in some manner symbolical, will confound all the physical sophisms and alogisms which have been advanced, in contradiction or perversion of the record which that pen was commissioned to inscribe. This is not the language of self-confidence, but of perfect confidence in the tried and closely examined Word of God; and, it is a confidence which I am not in the smallest degree disposed to relinquish, merely lest some cynical

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[1] *Introduction* to Geol. of England and Wales, p. lvi. lvii.

critic should think good to represent it as the former. Such a critic, would readily find the language of self-confidence in the declaration—" I am wiser than *all* " *my teachers,* because *Thy testimonies* are my medita-" tion[1];" yet does that declaration express no more than the devout acknowledgment—" *Thy testimonies* " have better instructed *my ignorance,* than the doctrines " of *all my human teachers.*" And, in the confidence which I here avow, I affirm no more, than that the *Record of God* imparts to the darkness of my intelligence an infinitely greater light to illustrate the questions of the FIRST FORMATIONS and CHANGES of this Globe, than any that I have been able to collect from the instructions of all the principal *geological teachers* of the age; whose doctrines, nevertheless, I have with the utmost care and diligence studied, scrutinised, and compared.

17. The able Edinburgh Reviewer of the *Reliquiæ Diluvianæ,* however, regards this whole argument as " *threatening to take us back again to the darker ages of* " *geology*[2]." This is whimsical; because, I find my mind relapsing into darkness, in proportion as I recede from it towards that which he would preferably advocate. If, finding precisely the terminating point of human knowledge and tracing that knowledge to the point beyond which it cannot proceed, be taking us back again to darkness, the Reviewer's fears are not unfounded; but, if the process does not attempt to *pass that point,* it then becomes the surest safeguard we can have to prevent the mind from plunging into darkness; for, such must be the sphere into which it would necessarily pass, if it attempted to expatiate beyond the point that termi-

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[1] Psalm cxix. 99.

[2] *Edin. Rev.* No. lxxvii. p. 206.

nates the retrospective knowledge which our intellect is naturally capable of acquiring. "It seems at present to "be universally admitted, (observes this critic,) that the "object of Revelation was the *religious and moral discipline*, not the literary and scientific instruction, of "mankind[1]." But, does he well reflect, that the inquiry which he would discountenance and prevent, is far more intimately connected with *religious and moral discipline*, than it is with literary and scientific instruction? that its connexion with the former is essential, but with the latter only incidental? This writer, unquestionably brings to the discussion a mind strongly charactered by intellectual ability and integrity; although, not entirely liberated from the influence of inveterate prepossessions. The principle which he lays down as the canon of inquiry, is an evidence of the former qualities: "to speak of the support to the "Sacred narrative afforded by extrinsic inquiry, if the "narrative itself be made to form a part of the evidence, "is (says he) a mode of reasoning which appears to us to "be altogether inadmissible[2]." No doubt, it is so; for, it would be to reason *in a circle*, which could never establish any thing. Again; "if the testimony of science "can ever be of any value in support of Scriptural history, "the *physical researches*, by which it is intended to "confirm the historical statements, should be *most strictly* "*independent*[3]." This is only another mode of presenting the same undeniable principle. Sound and unimpeachable, however, as this principle is, it is in no manner applicable in the way of opposition, to the argument of the *Comparative Estimate;* as this critic would himself ingenuously acknowledge, if he could resolve to bring his mind to a thorough examination of it. The *Comparative Estimate* does not reason in a circle, nor does it desire to impair the independency of physical research; on the contrary, its strength is in that independence. It, first, produces *the genuine statements of the Scriptural record* and assumes them *to be true,* generally, upon *moral grounds* probably similar to those on which the Reviewer professes his own firm belief in the truth of Revelation[1]; these are its premises; and it, then, confirms the assumed truth of those statements, specially, by the *results of the independent researches of physical science.* It distinguishes, indeed, between the *results* of the researches, which are *facts,* and the *conclusions* of the science, which are *opinions,* and, whilst it accepts the former, it rejects the latter; because, as the *facts* prove the truth of the Scriptural *statements,* so they necessarily prove, at the same time, the error of the *opinions.* This upright Reviewer certainly does not mean to say, that we may not take the *facts* without taking the *opinions* annexed to them; granting, then, the equitable right of separating the one from the other; the *Comparative Estimate* conforms rigidly to his own rule—"*confirming the historical* "*statements of the Scriptural record, by the results of* "*physical researches most strictly independent.*" I will cherish a hope, that the wider development of my argument in the present extended Edition, may succeed in making a nearer approach to the seat of conviction of this able and ingenuous critic. At all events, I am sensible of the courtesy with which he qualifies the force of his dissent; and especially, of that with which he disclaims a note surreptitiously appended to his article in its progress through the press[1].

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[1] *Edin. Rev.* No. lxxvii. p. 196. [2] Ib. 230. [3] Ib. p. 198.

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[1] *Edin. Rev.* No. lxxvii. p. 229.

18. I wish I could speak in the same tone of my distempered flagellant of the *British Critic;* but—" *qui* " *admonent amicè docendi sunt, qui inimicè insectantur re-* " *pellendi.*" This ardent critic should have lived at least three centuries ago, when reviews *ad excommunicationem* might have acquired some measure of power. In the fervid zeal with which he appears to copy the proceedings of the Pontifical College of 1622, he thus fulminates his Inquisitorial sentence against this Work: " The *Compa-* " *rative Estimate* has more rudely assailed *our* feelings " of religious decorum, than they were ever assailed " by the most extravagant hypothesis of the most daring " speculations of the French and German schools.— " The Mineral Geology, with all the freedom of its " assumptions and the daring spirit of its hypothesis, " has never ventured to insult the common sense of " mankind with such *absurdities.*—The reveries of " Buffon, are pious and philosophical compared with " it: Hutton's eternal renovations, and Cuvier's nume- " rous debacles, are innocent postulates when weighed in " the balance against the sacred cosmogony of this *modern* " *dreamer.*—No serious reader will tolerate so *gross* " *a misapplication of Scriptural language as We find in* " *almost every page.*—It attempts the union of *two things,* " *which have nothing in common.*—It brings no acceptable " tribute, either to *philosophy* or *religion*:—its labours " tend most obviously and directly to the *disparagement of* " *both*[2]." Such is the summary and definitive judgment

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[1] *Edin. Rev.* No. lxxviii. in fine.

[2] *British Critic* for April 1824, p. 387—402.—The model of this miniature imitation (which, it must be acknowledged, has not

pronounced by this Pontifical Reviewer on the following Work; in the hope of being able, by one sturdy effort, to impound it in his *Index Expurgatorius*. Although this learned censor will probably have discovered the efficacy of these and all similar latrations, and will have become sensible of the inconvenience which ever attends the emission of the "*irrevocabile verbum*" in a paroxysm of polemical intemperance, I am still desirous that the judgment which he has sent forth into the world should be brought distinctly and fairly before my readers. I have greatly to lament, and even to complain, that his propositions are not sustained by the evidences which they were entitled to demand; and which he himself was bound, by the most ordinary rules of honour and veracity, to produce.

19. There are some animals so ferocious, that they will fly at the hand which proffers them food; regardless of the food, in fear of an insidious assault, through a suspicious instinct of their natures. Through a similar instinct, my Reviewer makes his spring at the *Comparative Estimate*; under a suspicious fear, that it is fraught with

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ill preserved the spirit and tone of its original) is found in the judgment pronounced at Rome by the Seven Cardinal Inquisitors, on the philosophy of Galileo, in 1622. "To affirm that the Sun "is in the centre, absolutely immoveable, and without locomotion, "is an *absurd* proposition, *false* in sound philosophy, and moreover *heretical*, because it is expressly contrary to Holy Scripture. To "say that the Earth is not placed in the middle of the world, nor immoveable, is also a proposition *absurd* and *false*, in sound philosophy; "and, considered theologically, it is at least *erroneous* with respect to "faith." Whereupon Galileo, so refuted, was compelled on his knees to "abjure, curse, and detest, the *absurdities*, *errors*, and *heresies*," which the sagacity of the Cardinal Reviewers and Inquisitors had discovered in his writings.

some unseen mischief tending to affect the comfort and serenity of the Church militant. But, the animals fly, because they neither *think*, nor *reason*. How far, and to what purpose, my Reviewer does either of those two things in the subject of which he has appointed himself judge in the last appeal, I shall now proceed to shew, by means of the opportunities with which he has been pleased to supply us. When a literary judge takes his seat on the critical bench under his own Commission, and only displays his incompetency and injustice whilst he sits there, he cannot lay claim to any very large measure of our deference; and, a British Reader will not condemn a plain exposure of that incompetency and injustice, when it is made in the course of equitable and requisite self-defence, and when it is, moreover, rendered necessary, by the respect due to the Reader himself.

20. In the first place, then, my Reviewer, avoiding, by a prudential silence, any collision with the *first and grounding part* of my argument, begins his criticisms by collecting all his energies to engender and condense an axiom, the explosion of which shall shatter the *sequel* of the argument to its foundation, and render the overthrow of its parts an easy operation; and he intonates it thus — "*there is no such thing in the Bible as a* MOSAICAL "GEOLOGY[1]."

This is a formidable *dictum*. But, it is unfortunate that this ingeniously devised engine should prove, on examination, to be only a quibble of words as uncreditable to a judge in a court of letters, as it would be to a judge in a court of law. That Moses formally and didactically propounds a *system of geology*, is not alleged, assumed, or implied in the *Comparative Estimate*, as the critic himself must perfectly well know; but, if Moses has recorded any *facts* respecting the *primitive history of this Globe*, paramount and fundamental *facts*, such as those which have been above recited, then it would be as foolish as it would be fruitless to deny, that he has imparted to us *geological facts*. To geologise *in exclusion* of those facts, would be to geologise *un-Mosaically;* and to geologise *with inclusion* of those facts, would be to geologise *Mosaically*, or, in conformity with the authentic information communicated to us by Moses; and, the geology grounded on those communications, will be rightfully called *Mosaical*. Such only, is the *Mosaical Geology* opposed in the following treatise to that other geology, which takes no account of the geological facts that Moses was commissioned to impart, but only of such as it imagines are sufficiently declared, and attested, by *mineral phenomena alone*; and which has, therefore, with equal propriety, denominated itself *Mineral Geology*[1]. And thus, the reader will perceive the real quality of the Reviewer's *axiom*, and, at the same time, the measure of his respect for his readers and for himself, when he proceeds to assert, that I "see in the *first chapter* of Genesis a *well-connected* "*and most luminous compend of an* ENTIRE GEOLOGICAL "SYSTEM[2]."

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[1] *British Critic* for April 1824, p. 388.

21. With the same complexion of mind, he speaks of the "*theory*" of the *Comparative Estimate;* he might, with just as much sense, have spoken of its *metre*. It is not much to require of a Reviewer, that he should under-

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[1] See vol. i. p. 17, of this Work. [2] *Br. Crit.* p. 388. See above, § 12.

stand the meaning of the words which he uses; that he should know what *theory* is; that he should comprehend the difference between arguing from *theory* and arguing from *facts;* and that he should be able to distinguish, whether the conclusions of which he appoints himself the arbitrator, are deduced from the one or from the other. In fact, he appears to consider *theory* as synonymous with *premises;* and, that conclusions which are deduced *at all,* must necessarily be deduced *from theory*—quasi *premises.* The *Comparative Estimate* does not contain a *theory, first* imagined, and *then* fastened upon the Scriptural narrative; as, when Buffon *first* imagined, that this earth was a lump of matter struck off from the solar orb by the blow of a comet, and *then* compelled the Mosaic narrative to conform itself to that imaginative conceit: it consists, wholly, of *inferences* deduced, directly and in the first instance, from the *terms of the narrative,* compared with the *known operation of established causes.* Buffon reasoned from a physical theory to the statements of revelation; the *Comparative Estimate* reasons from the statements of revelation to physical facts. The great events inferred, had no *previous inventive existence* in the mind, but were originally *induced into the mind, bonâ fide,* from the terms of the record, as its true and genuine expression when closely studied and passively listened to; and, this *fact* renders the *correspondence* of the "*results of independent physical research*" with the "*terms of the narrative,*" the more solemnly impressive. *Theory,* originates in the *human brain;* and, that which originates in the *human brain,* can never yield results commensurate with the works of God in creation; but, that which originates in the *express terms of Scripture,* may yield those commensurate results. The conclusions from *theory*, are determined by the *theory;* those from *facts*, are determined by the *facts*. Theories, may be as numerous and as various as the individuals of mankind; facts, must ever remain one and the same. The conclusions in geology of the *Comparative Estimate*, are all ultimately deduced from the *geological facts* declared in the revealed record of Moses; and therefore, they are not deduced from any *theory*.

22. Our sensitive Reviewer is exceedingly indignant, because I have distinguished between the Divine *creation* of the world, and the Divine *maintenance and perpetuation* of it after creation. It is nothing to him, that Bacon and Newton and every body else, it is nothing to him, that Moses and all the inspired writers, do the same thing; his zeal, derives particular offence from that distinction in the *Comparative Estimate*. "*Creation* "(he affirms didactically) is a term, which, *as it expresses an act* altogether incomprehensible to the "human mind, *conveys no meaning;* and, of course, "presents no topic for analysis or research[1]." How a term *expresses an act* and yet *conveys no meaning*, or, how it *conveys no meaning because it expresses an act*, are points which have been left for the discovery of this peracute Critic. Does he think that the term "*incomprehensible*" conveys no meaning, because we cannot comprehend that which is incomprehensible? That the term "*creation*" presents no topic for analysis or research, is undeniable, and therefore no one, I apprehend, was ever yet so absurd as to attempt to analyse or investigate the operation *which it implies;* but, I also apprehend, that it is the *meaning expressed* or *conveyed by the*

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[1] *British Critic* for April 1824, p. 391.

term that deters from the attempt. If it "*conveys no* "*meaning,*" how came the sacred writers, in theology, and Bacon, Newton, &c., in philosophy, to use it so familiarly, as a term which *conveys a meaning* to every capacity? which readily understands it to express that Divine operation, by which "God calls those things which "are not as though they were." But, though he says this term conveys no meaning, he yet "deprecates the "attempt to found a *distinction* between the exercise of "Divine Power in *creating* the world, and the *operation* "of the same Power in *perpetuating* its existence." Does this last term, then, *convey no meaning* also, since the two are not to be *distinguished?* Those who differ from my learned censor, and who are of opinion that each term conveys its own proper and distinguishing meaning, will apprehend a distinction between the *operations* of *calling into* existence, and of *maintaining in* existence; nor can he hope to efface that distinction from their minds, until he can transmit to them the extraordinary confusion of his own. "There is no real distinction (he "says) in the exertions of Omnipotence:—the *power* "which sustains the earth, is as boundless as *that* which "first called it into existence." Who questions this? and what is it to the purpose? This Reviewer reasons of *power,* which is *cause,* and of *operation,* which is *effect,* as if they were one and the same thing, and is totally insensible of his own entanglement.

23. Advancing in the same labyrinth, the Reviewer takes new offence, because I conform to a conventional phraseology, and speak of the operation of *secondary causes;* "a doctrine (he says) which has a much greater "affinity to the *atheism of Epicurus,* than to the simple

"and spiritual *theology of the Old Testament.*" It would have been honest and honourable to have produced my own words, which were these: "In the first act of Creation, this mineral globe was produced at once—and from that moment it was subjected to its proper laws: —for, as Bacon has pronounced, the laws which we call of *Nature,* are nothing but the laws of the *Creation*[1]." The words of Bacon to which I refer, are these: "God created heaven and earth, and gave unto them constant and perpetual laws, which we call *of Nature,* which are nothing but the laws *of the Creation.*" In what do these two propositions differ? or, which of them discovers "an affinity to the *atheism of Epicurus?*" If this judicial writer could be just, he must extend his censure to embrace Bacon also; but, that is a quality which he is most averse to call into exercise on the present occasion. For, whilst he puts my language out of the pale of his protection, he is the protecting and liberal advocate of all other writers, even of those who carry to the most equivocal and objectionable latitude the same language: "*Nature,* (he thinks it prudent to affirm,) and the *laws of nature,* are phrases which were assuredly NEVER meant to *supersede the acknowledgment of an Intelligent Cause* in the administration of the universe." If so, upon what ground will he attempt to justify his affectation of apprehending such a meaning in the argument of this Work, in which he *knows,* that that

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[1] See vol. i. p. 216, 217. I quote the words as they stood in the first edition; but, I have rendered the passage more explicit in the present edition, being taught by this Reviewer, that I had placed too general a confidence in the fairness of professional critics.

Intelligent Cause is most especially asserted? But, this Critic shews with what care he has prepared himself for the task which he has so confidently undertaken. Had he been as familiarly conversant with the "*theology of* "*the Old Testament*" as he here speaks tenderly of it, he would have recollected, that God Himself, by the mouth of His prophet, represents the heavenly bodies as subjected to certain "*ordinances*"—חקים[1], which the Septuagint correctly render νομοι—"*laws*;" and, that Divine application of *the figure* to the *heavenly bodies*, becomes a full and perfect warrant for the application of the *same figure* to every member of creation; without inducing the absurd and ignorant association of the "*atheism of Epi*-"*curus*."

24. The Reviewer now comes to state what he calls, my "*notions*;" and, first, he thinks good to affirm, that "I "imagine, that when the Earth was first formed, on the "first day of Creation, all the strata of which it was com-"posed were arranged in the greatest regularity, *consist*-"*ing of concentric layers like the coats of an onion*." We are in great need of a term, in argument, to express positive *falsity of assertion*, without any moral implication that shall render the employment of it indecorous and inadmissible; as we say, *false reasoning*, *false conclusion*: if we possessed such a term, it would find a signal application in this place. Not only is such a "*notion*," as is here gratuitously ascribed, not contained in the *Comparative Estimate*, or deducible from it by any mode of perversion, but it is essentially contrary to its obvious argument, which contends; that we are, and must ever remain,

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[1] Jeremiah, xxxi. 35.

entirely ignorant of the created structure of the globe, because, one portion of its surface was altered and modified, in the first formation of a *bed for the sea*, and the other portion perished in the destruction of the primitive earth; and, since the *Comparative Estimate* does not reason from *theory*, but from *data*, we have *no data* from which we may deduce that created structure. Whence then, it may be asked, could this "*dreamer*" (it is his own phrase,) have derived this "*notion*" which he assigns to me? I can conjecture only one probable source: that he had read in the *Vindiciæ Geologicæ*—"a great majority of the *strata* having been formed under water—"had no disturbing forces interposed, they must have "formed *layers*, investing in *concentric coats* the nucleus "of the earth[1];" and, that our Critic finding this passage in his head, quoting *memoriter*, and remembering *temeriter*, engendered in it the notion which he at length ascribed to the *Comparative Estimate*: that, from thence he procured his *strata*, his *concentric coats*, and his *layers*: his "*onion*," is very possibly his own. This is the most favourable solution I can devise for him.

25. My Censor, next assails the *formation of the sea-bed* on the third day of Creation; a *formation*, distinctly declared in the record, and vindicated to the Divine operation throughout the whole body of Scripture. In pursuing what he calls my "*notions*," he presents the following as *one of them*: "There was no place for the "water, which is accordingly described as enveloping "the whole surface of the globe.—Two days elapsed, "before a remedy was discovered, or an expedient de-"vised. At length, on the third day, a command was

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[1] Page 11.

" issued, that the waters under the heaven should be " gathered together unto *one place*, and that the dry-land " should *appear*.—Does not the Mosaical geology, according to the *hypothesis of Mr. G. P.*, represent the " All-wise Creator bursting and fracturing, on the third " day, the strata which had been formed only two days " before, to make a *bed for the waters* which enveloped " the globe? It has *never occurred to the Mineral Geology*, that a revolution so violent as to tear the framework of the globe, *could* be found necessary to accomplish the plans of Infinite Wisdom (which the Reviewer " measures by his own), almost in the very moment of " Creation itself[1]. On the first day, *according to Mr. " G. P.*, the mineral globe was produced at once; on the " second day after, in order to get rid of the superfluous " waters, it was deemed expedient that the solid barriers " of our terraqueous globe should be *burst*, in those parts " where depression was to produce the profundity. Is it " probable, *We* beg leave to ask, that either faith or piety " will be increased by *such a representation of the Divine " counsels and procedure?* has the wildest *theorist* hazarded such a statement as that now given; presuming " to teach the *reflecting part of mankind*, that it became " necessary to *rend* the globe two days after it was " created?" It would not have ill consisted with this effort of judicial wisdom, to have informed the intelligence of his readers, what he understood the historian to design they should apprehend by the reduction of the universal waters *into one place* within the sphere of the earth, on the *third day* of Creation, without a *sudden rending* of that sphere; and without perverting that third *day* into some false and arbitrary *period of indefinite length?* But, that "*rending of the globe*" is not left merely for rational and necessary inference; it is expressly and distinctly declared, as one of the great features in the transaction of Creation: "The Lord, by wisdom *founded* "*the earth;* by intelligence He *established the heavens;* "by His knowledge *the depths were rent*"—*εν αισθησει αβυσσοι εῤῥαγησαν*—ברעתו תהומות נבקע[1]. And, to render that description perfectly free from all ambiguity, the antecedent circumstances are thus described: "The "Lord possessed Me (Wisdom)—from everlasting; "*before He formed the earth,* and, *before He made the* "*depths*"—*και προ του τας αβυσσους ποιησαι*—באין תהמות[2]. We all *see,* that the waters of the ocean are actually gathered *into one place* or *part* of this terrestrial surface; and, the precipitous *cliffs,* below which they are every where gathered, demonstrate to the most common as to the most scientific observer, that they have been "*rent,*" or *cleft,* to form that place[3]. I shall here, therefore, use my just privilege of withdrawing myself from the arena; and shall leave this sensitive champion of the Old Testament, in his capacity of "*a reflecting* "*part of mankind,*" to determine this question in conflict with the sacred historian.

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[1] See vol. ii. p. 38.

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[1] Proverbs, iii. 20.

[2] Ib. viii. 24.

[3] This universal impression is evinced in the very term *cliff,* anciently *clift,*—"high growing on the top of rocky *clift*" (Spenser), i. e. *cleft,* from *cleave;* as *rupes,* from *rupi.* That *ῥηγμιν* (*θαλασσης*) is to be understood with the same etymological sense, as denoting sometimes, "*prærupta* maris," the *broken* or *cleft* line of the sea-coast, sometimes "*hiatus,*" the general "*chasm*" or *fissure* of the *sea-bed;* and not the *breakers* or *waves breaking on the shore,* for the word is used by Homer only in the singular; is shewn in the name of the city *Rhegium,* so called, because it was situated at the point where tradition reported a *breach* to have been made in the *continuity of land* which (it is said) anciently connected Italy and Sicily. Thus Strabo: *Ωνομασθη δε Ρηγιον, ειθ', ὡς φασιν Αισχυλος, δια το συμβαν παθος τη*

26. Our Critic advances to a consideration of the phenomena of the Deluge. "As the channel of the primitive "ocean would be entirely emptied by the transference of "its waters into this new channel, *We* (says he) are at a "loss to perceive, how the skeletons of animals which "were destroyed by this event, should be *incrusted in lime-* "*stone strata* formed at the bottom of the ocean: *this is a* "*difficulty which Mr. P. has not attempted to remove*[1]." Yet, he professes by the second title of his article to have reviewed, and he actually quotes from, my "*Supplement*[2]," which Tract is employed on no other subject than the removal of the particular difficulty which he here gives himself credit for having just found out[3]. "As the "waters (he continues) are supposed to have rushed from "their present land, which was formerly sea; into the

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χωρᾳ ταυτῃ· ΑΠΟΡΡΑΓΗΝΑΙ γαρ απο της ηπειρου την Σικελιαν ὑπο σεισμων, αλλοι τε κᾳκεινος ειρηκεν

αφ' οὗ δη Ρηγιον κικλησκεται.

p. 396. (258.)—And Pliny: "Sicilia—quondam Brutio agro cohærens, "mox interfuso mari avulsa.—Ab hoc *dehiscendi* argumento, *Rhegium* "(ρηγιον) Græci nomen dedère oppido *in margine Italiæ sito*. (N. H. lib. iii. cap. 8. (14.) When Homer makes his navigators disembark, to pass the night επι ρηγμινι, it plainly signifies the *breach* or *beach* of the sea; when he speaks of the βαθεια ρηγμιν, it expresses the general *chasm* or *profundity* of the sea-bed. It is observable, that the words *breach* and *beach* occur as synonymous in our old English. Thus, Spenser's "utmost "sandy *breach*" (F. Q. c. 12. book iii. st. 21. and notes, TODD,) is the same thing as Shakspeare's "*beachy* girdle of the ocean;" the former word having apparently been softened into the latter, which knows no other etymon.

[1] *British Critic* for April 1824, p. 400.

[2] Ib. p. 397.

[3] See vol. ii. p. 283 of this Work.

“ bed of the present sea, which was formerly land; is it “ not to be presumed, that all the *moveable substances* “ would obey the impulse of the current, and be carried “ into the deep? It is therefore at the bottom of the “ present seas, and not *on the land*, that *We* should expect “ to find the remains of antediluvian elephants, rhinoceri, “ and hippopotami.” When a skimming and a dipping censor requires elucidations and answers which are amply supplied to those who read the whole of a book, the author may reasonably give himself the repose of not listening to his requisitions. This questioning Critic would exceedingly enlarge the sphere of his own ideas, if he would make an excursion to Ramsgate, and dig in the mud of the harbour after the ebbing of the tide; he would then enable himself to answer his own questions, and to ascertain, whether the substances which he found *imbedded within the mud* were to be accounted *moveable substances*, and whether they had “ obeyed the impulse of “ the superficial current, and had been *carried into the* “ *deep*.”

27. “ Does the Mosaical record (he further asks) “ give any countenance to the supposition of such tre- “ mendous concussions and collisions, such force and con- “ flict of waves, and such oceanic vortices? Who, before, “ ever imagined that the action of *a troubled water* would “ dislocate and fracture the bones of animals covered with “ flesh and skin?—a *theory* which requires such very im- “ probable accommodation of circumstances, shocks *Our* “ belief, while it excites *Our ridicule and contempt!*” Ωμοι! But who, I may ask, who knew what the sea is, was ever so extremely imbecile, before this Critic, as to question such “ tremendous force and conflict of waves,”

when the diluvial "*waters increased and prevailed exceedingly upon the earth,*" and, until they "*were assuaged*[1]?" or who, that ever saw a boat staved by a wave, and reflected on what he saw, can doubt the power of waves to dislocate or fracture, by collision, animal frames congregated in vast compound masses? It would not be difficult to give our sceptical Critic experimental proof, in his own person, of the power of a wave to "dislocate and fracture bones still covered with flesh and "skin[2]. Yet, his mind can conceive nothing more in the momentum of the universal ocean in preternatural tumultuous action, than what his own personal experience may have chanced to witness in the "action of a *troubled water.*" And, even this "*troubled water*" is a great deal for him to grant; for, he elsewhere observes, with consistent sagacity: "On the *smooth surface of the*

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[1] See the description of this catastrophe by Philo, vol. ii. of this Work, p. 26.

[2] The power with which a *single wave* is capable of acting upon a particular point, may receive additional illustration from the following example. On the 14th of October, 1822, a wave, which during a storm broke against the pier of Ramsgate, and was dashed upwards to a height of about 14 feet, fell again upon the stone pavement of the pier-head; and, by the force of its re-action, *instantaneously* raised a 36 pound carronade, with its carriage, *over* a stone ledge some inches high, and precipitated it into the sea. The harbour-men assured me, at the time, that it would have required the united efforts of 20 men to effect the same operation. A gentleman, on the same day, who apprehended no power in the apparently exhausted spray which occasionally surmounted the higher parapet, was driven by it against a granite-post with so much violence, as to be obliged to be conveyed home in a boat; having received some severe contusions. If this statement ever meets his eye, he will no doubt bear testimony to its truth.

" *waters* on which the ark floated so many months, we " can no doubt *easily imagine* that the carcasses of " animals *would also float;* and, *if we were told,* that, " when the waters subsided, the remains of those animals *were deposited in the mud* which, during the " continuance of the deluge, had formed at the bottom, " we should *not find it very hard* to yield Our credence " to any hypothesis founded upon such a statement." This cautious philosopher must, in consistency, doubt, whether the offals thrown from the ark sunk and were deposited in the bottom; because *he is not told so*. But, I apprehend, that our reason is left to extend its credence a step or two beyond what *it is told*[1].

28. In remarking on the inspired notification of the *substantial difference* between the antediluvian and postdiluvian *earths*, the Reviewer holds himself perfectly competent to pronounce at once—" there *can be no doubt,* WE " *presume,* that the perdition commemorated by St. Peter, " respected *only the living creatures.*" The 2d and 3d Chapter of Part III. of the following treatise, will fully reveal the measure both of the knowledge and the presumption which have conspired to bring him so promptly to this easy and categorical conclusion.

29. The Reviewer, at length, turns his reflection to the *Cave of Kirkdale,* and to the controversy to which it has given rise; and he complacently remarks: " it is *some-* " *what puzzling* to observe, that amidst the numerous " relics of the elephant, the rhinoceros, the hippopota- " mus, the ox, the horse, the deer, the hare, and the " rabbit, there should be *no skeletons of the hyænas them-*

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[1] See above, p. xxv.

" *selves*. Mr. Buckland conjectures, that they (the *hyænas*) " were occasionally killed and devoured by the stronger " individuals of their own species, and, that *both young* " *and old were always eaten up after natural death*[1]." What *hyænas*, I would ask, is the worthy Critic here talking about? If there were " *no skeletons of hyænas* " *themselves*," what can *hyænas* have to do with the Cave at Kirkdale, or why are they at all pressed into the discussion? he might as well have talked about *camels*. This reflecting censor, never thought of asking himself that question. It must, indeed, be " *somewhat* " *puzzling* " to the Professor of Mineralogy, to find, that, after having written a quarto volume to account for the *presence of the relics of skeletons* of between 200 and 300 hyænas which *he saw in the cave*[2], he should be understood by a Reviewer laying claim to extraordinary acumen, to have written only in order to state, that *he saw none in it*.

30. There is an obliquity in the knowledge of this learned Judge, which curiously resembles that of Homer's *Margites*:

> " He knew many things, but he knew them all *wrong*."
> πολλα δ' επιστατο εϱγα, κακως δε 'γ' επιστατο παντα[3].

This obliquity of knowledge, differs from ignorance chiefly in this; that the latter may be accompanied with modesty, but the former cannot. Hence, my Reviewer takes no account of the opposite judgments given on the *Com-*

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[1] *British Critic* for April 1824, p. 398.

[2] " I cannot calculate the total number of *hyænas of which there is* " *evidence*, at less than 200 or 300." *Reliq. Diluvianæ*, p. 17.

[3] *Exam. of the Prim. Arg. of the Iliad*, p. 357.

parative Estimate, by previous Critics, (which the Edinburgh Reviewer, though adverse, ingenuously points out); but, he silently involves them all, by implication, in the sentence of his own anathema. He employs, as a matter of course, the technical plural " *We*," throughout his article; but, I shall not, without other evidence, entertain a belief that it is truly comprehensive of the learned body of his coadjutors, but shall regard it only as a notable and cautionary evidence, of the misplacement of their confidence.

Notwithstanding the decision of his judgment, therefore, I again offer the *Comparative Estimate* as " a " tribute to Philosophy and Religion;" and I do so with augmented confidence in this new Edition, because it has been accepted as such, in its first more imperfect form, by many minds of a very different compass and altitude from his. Although he asserts, that " *he finds* " *misapplications of scriptural language in almost every* " *page*," he has not risked the exposure of his learning and criticism by adducing *one*; and it will be impossible for him to shew, that he was even influenced by a fair and scholarly conviction of such " *misapplications*," when he resolved to hazard that injurious, unsupported, and unsupportable asseveration.

31. But, before the question, of the *connexion* of Scriptural statements and Geological discoveries, can be entered upon at all, the Comparative Estimate presents a *preliminary argument*, which those who oppose the connexion must dispose of, before they can qualify themselves for any opposition to the ulterior question. That preliminary argument, throws all the *onus* of proof upon them. It is in vain to slur over, or to attempt, by an affectation of ignorance of its existence, to elude that

great argument, which the exhausture of the first edition of this Work has now placed very extensively before the world; by which argument, all pretensions to philosophical and logical investigation of the general question, are brought to the proof. That *preliminary argument* affirms, and demonstrates; that, in the great question of *first formations* of the material system of this globe, in all the *three* component *kingdoms of nature,* (as they are called,) no difference of *mode* of those formations can be rationally alleged, or assumed; that, the first *bone,* the first *wood,* and the first *rock,* were necessarily produced by *one and the same mode;* and, that no *phenomena* which either of the three could exhibit, could possibly indicate that mode to the *intelligence,* although they might very easily deceive and cozen the *imagination.* Until that *preparatory argument,* which is purely *philosophical* and *logical,* shall be distinctly refuted; until an *essential difference in principle* between the three cases alleged, shall be positively shewn, and *demonstrated;* all direction of opposition to the succeeding arguments, will be a waste of time and of words. That great argument (which, by demonstrating to the mental sight the *ne plus ultra* of its capacity of penetration, applies the axe to the root of intellectual *self-sufficiency,* and therefore, of *self-delusion,*) is pointed out with proportionate concern, to the attention of their readers, by two Reviewers of the *Comparative Estimate*[1]; but, the third, the Reviewer in the *British Critic,* passes it over in profound taciturnity, not only without testifying assent or dissent, but, without apprising his readers, that an argument of such material interest, both to *philosophy* and to *religion*, exists in the book which his only aim is to suppress altogether from their knowledge: thus, revealing the temper and extent either of his zeal, or his knowledge, in that cause of which he affects to appear so sensitive and able a champion.

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[1] The *Eclectic Review* for January 1823; and the *Journal of Science,* No. xxix.; and, whilst this page was in the press, by the *Congregational Magazine* for the present month, May 1825, p. 259.

32. But, I turn to a Critic, the quality of whose mind, though equally in opposition, inspires confidence and respect; and I invite the Edinburgh Reviewer of the *Reliquiæ Diluvianæ* to apply to that preliminary argument the same *acuteness*, and the same *integrity of intellect*, which he has displayed in his discussion of the latter work. I invite him to do one of the two things, which, if he accepts my invitation, he will infallibly do; either, to *refute it* clearly in its principles, or, ingenuously to *acknowledge its power*[1]. If he do the latter, we cannot long be at variance with respect to the *prudence* of pursuing the succeeding arguments; which demonstrate, the intimate connexion of *true Geology* with the *declarations of Revelation* concerning the *first formations* and *subsequent changes* of this globe. He declares, indeed, that "his own belief in the truth of Revelation rests "upon grounds too firm to be shaken by any *failure* "*of coincidence* between the results of physical inquiry "and Sacred History;" he must, therefore, derive a rational gratification, at least, from a demonstration, that there is no such failure of coincidence. But, all inquirers do not stand upon the same ground with himself; there are many, very many, who, in this age of mineralogical scrutiny and geological theorisation, anxiously and reasonably seek for a *plain evidence of*

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[1] See vol. i. p. 96, *note*.

the coincidence, to give a sound, unperplexed, and comfortable establishment to their belief. It is to these, that the *Comparative Estimate* is especially addressed. In it, they will find that *coincidence,* that *connexion* of Sacred History and Physical Discovery, unartificially laid before them; by merely *combining* the light which *Physical Discovery* has dispensed in this our own age, with that which was dispensed in a former age by the Revival of *Letters and of Learning:* both which lights must *unite,* for the complete elucidation of the great subject before us[1]. They will, at the same time, see equally laid before them, the fraudulencies of intellect, by which *infidelity,* under the mask of *philosophy,* has, for the last two centuries, beguiled the physical science of Christendom into a blind cooperation with its own hostility against the fundamental truths of Revelation.

The pure Science of *Mineralogy* will be no otherwise affected by this issue, than as it will have to choose, between a foundation of *phantasy,* and a foundation of

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[1] It is most certainly true—" that no man can be qualified to enter " any of the highest walks of *Science,* who is acquainted with only one " branch of natural knowledge; and the mutual dependence of them all " is now so positively demonstrated, that the *philosopher* of our days can " no longer be allowed to remain satisfied with those inquiries which " belong exclusively to any single branch, but must extend his investiga- " tions over the whole range of Sciences, and illuminate his path by the " *varied combinations of them all.*" (*Vindic. Geol.* p. 10.) But, it is also no less certainly true; that all the *physical sciences combined* cannot serve the *philosopher* to apprehend the *historical basis* on which alone the complex Science of *Geology* can securely stand, unless he is further succoured by the concurring auxiliaries of *Sacred and Ancient Learning.* If he would attain to that apprehension, he " can no longer be allowed to " remain satisfied " with the exclusive illumination of the *Physical Sciences.*

fact. Its own order and arrangement will remain exactly the same, whether *granite*, and *limestone*, be the products of *Chaos*, and of *precipitation*, or the products of *Creation*, and of *oceanic aggeration* and *desiccation*: it will be still the same, whether we denominate the *four* great mineral formations of the globe—*primary*, *intermediary*, *secondary*, and *tertiary*, or whether we denominate them—*creative*, *fragmentary*, *sedimentary*, and *diluvial*. The only difference will be; that, in the first case, Mineralogy will allege effects without any historical knowledge of their causes; and, in the second case, it will allege them with positive and distinct historical knowledge of their causes.

33. It is, no doubt, most highly gratifying and remunerating, after labour taken, to obtain the approval of those who are competent judges of our work; but, if the following Treatise shall be found to impart *nothing* tending to serve the cause which it aspires to serve, I am the last person to wish that it should be propped by the favour of any *Reviews*. If, on the other hand, it shall be found to contain *any thing* possessing that tendency, it will maintain its ground and work its effect, in despite of all the literary or scientific parties of the day; which may, indeed, somewhat impede its course for their own generation, but cannot for posterity: *Truth*, not being as frail and as mortal as themselves. To that issue, I shall very contentedly leave it; since, I write not in prospect of present fame, but in full confidence of ultimate efficiency.

34. With respect to the many eminent and distinguished names with which the argument has inevitably brought me into collision; it cannot be supposed, it will not be supposed by minds of any elevation, that I have

written with feelings of acrimony, hostility, or disrespect towards the *individuals*, merely because I have strenuously assailed the *errors* which their arguments are calculated to extend; every hostile feeling is absorbed by the errors, and the only feeling with which they themselves inspire me, is a jealousy of estimation on behalf of that Sacred Authority which rightfully claims the entire devotion of their great and splendid endowments. Though courtesy, by the laws of chivalry, was ever to precede, accompany, and follow the tournament, and never to be relinquished, (from which laws I am not conscious that I have in any instance departed); yet, I never read, that it was accounted courteous to *fight feebly*, in order to procure the prize for the opposite party. The purpose, for which the lists were entered, was to be actively and energetically pursued; and, whichever party was unhorsed fairly, no want of courtesy was imputed to the vigour of the charge; nor, if they were true knights, would it in any degree corrupt the courtesy of the feeling. As those contended exclusively for *honour*, so I shall assume, that our contest will be exclusively for *truth*. We are not to copy the French peasant, who ran in the night to fetch a priest to his dying father; and who knocked at the priest's door for three hours gently, *for fear of waking him*[1]. I respectfully invite refutation, and am equally ready to acknowledge with frankness the power of victory in an adversary's argument, or, still further to demonstrate its fallacy or its infirmity. "In pugna pugilum et gladiatorum, "plerumque non quia fortis est vincit quis, aut quia "non potest vinci, sed quoniam ille qui victus est, "nullis viribus fuit: adeo idem ille victor, bene valenti "postea comparatus, etiam superatus recedit[1]." I shall honour and esteem that writer, who shall demonstrate the errors of my argument on this great subject, with feelings congenial to those with which I have pointed out the errors of others. Let him only accomplish his task sincerely, and successfully, and he cannot expose too severely for my sensibility the *reality* of the errors, inconsequences, or absurdities which he may have to reveal; that they may not mislead others, and may cease to mislead myself;

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[1] "Le père d'un paysan se mouroit. Le paysan fut la nuit "trouver le Curé, et demeura trois heures à sa porte à heurter *douce-* "*ment*. Le Curé lui dit: Que ne heurtiez-vous plus fort?— "*J'avois peur, dit-il, de vous réveiller.*" *Dict. d'Anecdotes*, tom. ii. p. 212.

οφρα τις ὡδ᾽ ειπησιν Αχαιων τε Τρωων τε·
η μεν εμαρνασθην εριδος περι θυμοβοροιο,
ηδ᾽ αυτ᾽ εν φιλοτητι διετμαγεν ἀρθμησαντε[2].

But, this supposes an *Ajax* in an opponent. If I obtain a *competent, just,* and *honourable* refuter,

"Possum ego censuram scriptoris ferre *severi,*
"Et possum modicâ laude placere mihi."

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[1] TERTULLIAN, *de Præscriptionibus,* &c. cap. 2.

[2] Il. vii. 300.

ERRATA.

Vol. I. p. 315, line 1, for 50 *lunar years*, read 50*th lunar year*.
p. 326, — 16, for *quid*, read *quod*.

Vol. II. p. 114, line 17, dele *it*.
p. 261, *note*, line ult. for *Chorographia*, read *Chronographia*.

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PART I.

OF THE MODE OF THE FIRST FORMATIONS OF THE EARTH, ACCORDING TO THE MINERAL GEOLOGY.

A
COMPARATIVE ESTIMATE
OF THE
MINERAL AND MOSAICAL
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CHAPTER I.

The characters which unfold themselves to our view in examining the substances of which this Globe consists, point out to us some period, or periods, when the order of its structure sustained violent *agitation* and *alteration*. In every part of the earth, we encounter unequivocal evidences of *disruption*, *dislocation*, and *subversion*, of its hardest and most solid materials; and we discover remains, equally unequivocal, of *organic matter*, both *animal* and *vegetable*, involved and deeply imbedded in other of its materials, which are soft, or which must have been so at the time when those foreign substances were imbedded within them. Monuments so wonderful, and at the same time *universal*, naturally stimulated the curiosity of man to inquire, and to endeavour to ascertain, HOW, *and* WHEN, *those amazing effects were wrought in the substance of our Globe?*

An extended investigation of the same characters, led to this further observation: that the *organic substances*, are not found indiscriminately in *all* the materials of which our earth is composed; that they are found only in *one* order of them, whilst in *another* order they are *never found at all.* This remarkable fact, well established, gave occasion to a division of the materials of the earth into *two general classes*, distinguished chiefly by the *presence* and the *absence* of organic remains; and, since it was observed that the materials in which those remains occur, bear in general the appearance of *sediment deposited in water*, whereas those in which they never occur, wear a *crystalline* appearance; their respective *actual formations* were reasonably ascribed to different *immediate causes.* And, because those which appear to be *sedimentary*, are observed to be deposited *upon* those which appear to be *crystalline*, the latter, which sustain the former, were with equal reason assumed to be of a more ancient date; and, from thence, all the mineral matter of this globe was, for a long time, contemplated scientifically under *two* principal divisions, entitled *primary* and *secondary;* the *first* of which comprised the *crystalline siliceous matter*, containing no organic remains, of which kind are *granitic rocks;* the *second* comprehended the *sedimentary matter*, in which alone those remains are contained; such are, *calcareous, and other earths, containing sea-shells.*

But, an *intermediary* or *transition* class, of fundamental importance to these inquiries, called also with more propriety and pertinence *fragmentary*, was afterwards recognised, with great sagacity, and has of late years been introduced between the two; consisting of a *modification of the primary class*, and comprising the mineral masses formed of aggregated and conglutinated *fragments* of different *primary* rocks, but rarely inclosing any organic remains; such is, the coarse sandstone denominated *millstone-grit*, and that species of compound rock which is called *pudding-stone.*

Lastly, the accuracy and minuteness of research, has recently superadded to the *secondary* division a *tertiary* class, more correctly termed *upper-secondary;* consisting of superficial detritus, (as *gravel beds*), and containing relics of terrestrial organic substances.

Thus, the materials of our globe, or more properly of that portion of its superficial crust which the research of man has been able to penetrate, exhibit, in the order of their descending series, the following general characters; distinguished according to the different ages, and the refining progress, of mineralogical investigation: viz.

	I.	II.	III.
1	Secondary or Sedimentary.	Secondary or Sedimentary.	*Tertiary* or *Upper Secondary.*
2	Primary or Crystalline.	*Intermediary* or *Fragmentary.*	Secondary or Sedimentary.
3		Primary or Crystalline.	*Intermediary* or *Fragmentary.*
4			Primary or Crystalline[1].

In this last *fourfold* distribution of terrestrial matter, the *primary class* exhibits to us a part of the mineral matter of the globe in its *primitive*

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[1] "The distinction between the *four formations*, or *great divisions* "known by the names of *primary*, *intermediary*, *secondary*, and *tertiary*, "appear worthy to be preserved (says M. Humboldt).—The classification "of *formations* marks the *great epochas of nature*.—Werner, in creating "geognostic science, has perceived with admirable sagacity, all the rela- "tions under which we should view the *independence* of the *primitive*, "*transition*, and *secondary* formations." (*Geog. Essay on the Superp. of Rocks*, p. 28, 30, and 80.)

I have not here adopted Mr. Conybeare's ingenious innovation of these long considered and well established arrangements, which innovation increases the number of classes to *five*, because it excludes all *monumental character of epochas*, which is of chief importance in *Geology*, substituting for that of *fragmentary*, which is *historical*, that of "*roofing slate, &c. &c.*," which is purely *economical;* and, because it is entirely founded on the positions of the different mineral masses *relatively to the great deposit of* COAL: a point of reference, which, however advantageous in many *practical* respects it unquestionably is, pertains to *geographical* and *tabular* formation and texture, *previous to the existence of organised beings:* the *intermediary* or *fragmentary class*, exhibits the same matter in a state of universal fracture and disorder, in consequence of some violent force exercised upon it; the *secondary* or *sedimentary class*, indicates the universal, and long-continued, subjection of mineral matter to the dissolvent quality and mechanical action of water, *subsequently to the existence of organised beings;* and the *tertiary* or *upper secondary* class, indicates the latest universal action of water, in violent motion and progress upon the sedimentary surface. From which amazing *monuments*, and their *diversities*, the

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Mineralogy and not to *Geology*, which last, is *essentially historical.* He forms his arrangement thus:

1. Superior order.	*sand and clay,* *above the chalk.*
2. Super-medial order.	*sand and clay,* *beneath the chalk.* *oolites, n. r. sandstone,* &c.
3. MEDIAL ORDER.	COAL, *and carboniferous rocks.*
4. Sub-medial order.	*roofing slate,* &c. &c.
5. Inferior order.	*mica-slate, gneiss,* *granite,* &c.

(*Introd. to Geology of England.* p. vii.) This arrangement, it is evident, will correctly guide us to the *actual tabular positions* of the different mineral masses; but, it totally obliterates all their distinguishing *historical characters.* Mr. Conybeare makes a very obvious and specious objection to the last two of the above geological arrangements, because they assign the intelligence is naturally led to apprehend *four* corresponding, and succeeding *periods*, in the remoteness of time. 1. The period, of the *beginning* of this terrestrial system, when it received its *first mineral formation*. 2. The period, of a *violent disruption and dislocation* of a part of the mineral substances composing that *first formation*. 3. A period, of the occupation of our present earth by the *waters of the sea;* and 4. A period, of the destruction of animal and vegetable life by an universal *diluvial action* of those waters. These several characters unequivocally stamped on our globe, and of late years observed with peculiar

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term *secondary* to a class placed in the *third* degree from *primary;* or, to use his own words, "that the term stands properly distinguished from "*primitive* rocks only, and never ought to have been retained after the "Wernerian interpolation of the *transition* (intermediary or fragmentary) "class." (*Geology of Engl.* p. 59.) No doubt, if *numerical* arrangement be considered in the abstract, the term *secondary* ceased to be correct as soon as an *intermediary* class was interposed; but, considered *historically,* and with relation to *the subject,* the term *secondary* is important, and even correct. For, the *intermediary* class, under its character of *fragmentary,* pertains to the *primary;* being the immediate detritus of its superficies, and denoting an accident of its substance caused by violent convulsion and laceration. The *secondary,* on the contrary, denotes the long continued *action of water,* by solution and deposition, on the comminuted or fragmentary particles of those primary substances; and the *tertiary* class, is only the *complement,* or *ultimate term,* of the *secondary* or *sedimentary.* So that, viewed according to physical and historical truth, the *four* classes resolve themselves again into the *original two* — *primary* and *secondary.* Mr. Conybeare regards the term *transition,* as *theoretical;* it is certainly equivocal; but the more important term *fragmentary,* which pertains to the same class of formations, is strictly *historical.* For these distinctions, see Note [III] *On* M. HUMBOLDT'S *Theory of Rocks,* at the end of this volume.

ardour and application, have excited the ambition of science to investigate, and to endeavour to detect; *the* MODE by which, and *the* TIMES in which, those several classes of matter received their actual sensible formations.

The particular *Science* which undertakes to lay open to us these profound *historical secrets* of time and nature, has received the denomination of GEOLOGY; a science, whose pretensions are of the most exalted and comprehensive kind, since it extends its view to the *commencement of time*, and embraces within its scope the *origin* and *revolutions* of all terrestrial matter, *mineral*, *vegetable*, and *animal*.

" The science, as it is perhaps improperly
" called, of *Geology*, (observes a recent learned
" Journalist,) differs from all other sciences in one
" material respect. It contemplates, not only
" *what is*, but *what has been*. It embraces the
" *history* of our globe, as well as its *actual compo-*
" *sition;* it endeavours to trace, the succession of
" events which have preceded its present state;
" to ascertain, not only the changes which have
" taken place, but the *causes*, or, in other words,
" the *physical connexion* of those changes; and to
" determine the *order*, the *time*, and the *circum-*
" *stances*, under which they were effected. The
" province of the *Geologist* resembles therefore
" in some respects that of the *Historian:* he must
" diligently *examine ancient documents*[1]." " Of the

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[1] Quarterly Review, No. lvii. p. 138.

"many subjects to which the attention of Modern "Philosophy has been directed, (says the able au-"thor of the *Vindiciæ Geologicæ,)* *Geology* is perhaps "the last which has been advanced to that perfection "which may entitle it to be called a *Science:* its "elements have indeed been long accumulating, "and, in the accurate but limited observations of "a few strong-minded individuals, its seeds have "been scattered irregularly on the field of know-"ledge; but, it is not till lately that the germ "has quickened, and begun to advance towards "maturity.——GEOLOGY, *holds the* KEYS *of one* "*of the kingdoms of Nature;* and it cannot be said, "that a science which extends our *knowledge,* and "by consequence our *power,* over a third part of "nature, holds a low place among our intellectual "employments.—The field of the *Geologist's* in-"quiry is the *Globe itself:* it is his study to *de-*"*cipher* the monuments of the mighty revolutions "it has suffered:—and it is gratifying, to behold "*Science compelling the primeval mountains of the* "*globe to unfold the hidden records of their origin*[1]."

To attain to the *certainty of fact* in all these important particulars, is to arrive at an universal *principle of truth,* diffusing light and distinctness over every object of human contemplation; to be seduced into *error* respecting them, is to become involved in an universal *cloud,* spreading obscurity and confusion over every object. It is evidently, therefore, of the very highest concernment; that, in seeking for that *certainty of fact*, we should make choice of *the guide* competent to conduct us to it with the *most perfect security*.

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[1] Pp. 3, 7, 5.

Unfortunately it happens, that TWO *guides* present themselves to us, immediately at the outset of this pursuit, to importune and claim our confidence, which TWO *guides* are directly contradictory to each other; so *contradictory*, indeed, that whichever of them be *true*, the other must, of necessity, be absolutely and fundamentally *false:* these are, *the Mineral* and *the Mosaical Geologies*, already described, and distinguished, in the *Introduction* to this work. The *latter* of these, is of very great antiquity; and rests its credit, for the truth of the historical facts which it relates, upon a *record* claiming the authority of a *divine revelation*, and acknowledged in that claim, by the uninterrupted assent of thousands of the best and wisest of mankind, for *upwards of three thousand years*. The *former*, is of very recent origin, and can hardly be said to have existed in a state approaching to maturity, for much more than *half a century;* it does not, indeed, pretend to oppose any *record* to that of the other, but, it aspires to establish a series of *historical facts*, by induction from *sensible phenomena* and *chemical principles newly discovered;* which *facts*, it confidently affirms, disclose *evidence of truth* superior in authority to any that is presented in the *professedly historical document*, and must, therefore, qualify the *credit* which that document is *entitled to receive*[1]. When therefore we are told, in general terms, that "*Geology holds the* KEYS *of* "*one of the kingdoms of Nature;*" we plainly perceive the indispensable necessity in which we are placed, of inquiring discriminatively—WHICH *of the* TWO *antagonist Geologies it is, that is truly intrusted with* THOSE KEYS?

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[1] Of the quality and actual condition of this *new geology*, a correct general notion may be formed from the following statement, taken from a discourse in the celebrated continental Journal, the *Journal de Physique*, (tom. lxxx. p. 37, 38.) by the pen of M. de la Métherie, its conductor; and entitled "*Discours Préliminaire, ou Rapport sur les Progrès des Sci*" *ences pendant l'année* 1814." viz:

"The *primitive* earths, as forming the principal mass of the globe, " would naturally fix the chief attention of *geologues;* and accordingly, " they have occupied themselves with them in an especial manner. They " have propounded *different opinions* concerning their *formation.*

"1°. Some, who are called *Vulcanists*, believe that these earths are " the products of an *igneous fusion.* Buffon, Hutton, Playfair, Hall, " Fluriau de Bellevue, &c., have adopted this opinion.

"2°. Other geologues regard the nucleus of the globe, and the pri" mitive nucleuses, as the products of an *aqueous dissolution and crystal*" *lization.* It appears that this was the opinion of *the Egyptians, &c.* " I had embraced this opinion from the year 1777, in my *Principles of* " *Natural Philosophy*, and in my *Theory of the Earth.* Saussure, De " Luc, Werner, and a great number of geologues, maintain this opinion.

"3°. A *third* opinion, has been formed respecting these earths. " Anaximenes, after ancient philosophers, had said, that the world, and " consequently the *terrestrial globe*, had been formed of *Air and Infinity (d'air et d'infini)*, that is to say, of *aëriform substances. I have finally* " *adopted this opinion.*"

Any observation on this exhibition of the *progress of the sciences in* 1814, would be more than superfluous. That "*aqueous Theory*," from which M. de la Métherie departed in 1814, was called by M. Humboldt in 1804, "*votre belle 'Théorie de la Terre,' l'ouvrage le plus complet que nous* " *ayions sur cette matière.*" *Lett. to* M. de la Métherie *in Journ. de Phys.* tom. lix. p. 130, 131. Yet, M. Humboldt, in 1823, "did not hesitate to " range himself on the side of those geognosts who *rather conceive* the " formation of crystalline siliceous rocks by *fire*, than by an *aqueous* " *solution.*" *Superposition of Rocks.* 1823. p. 408.

To extricate themselves from the labour and embarrassment of *choosing* between two such different and adverse parties, some inquirers have attempted to employ them *both;* and, with that view have endeavoured, by various schemes of *accommodation,* to effect a *reconciliation between them.* But, the result has always been, that which must ever attend measures of undue compromise and concession; namely, *perpetual inconsistency in the progress,* and *ultimate failure in the issue.* There can be no *real reconciliation* between *positive contradictories,* no compromise between *truth* and *falsehood;* and therefore, since the generality of inquirers have exclusively followed *one* or *other* of these two guides, it is manifest, that *one division* of them must have been drawn into an error of the most extensive and injurious operation: for, as Cicero long since pronounced, "*labi, errare, nescire, decipi, et malum et turpe ducimus;*" and certainly, there are few subjects in which the force of that maxim can fall more heavily, than in this.

In this dilemma, there is only one course that *wisdom* will counsel, or *reason* sanction; and that is, to bring the pretensions of the *two opponents* fairly to an issue, by applying them both to some *common and agreed test:* by the decision of which *test,* we may be able to ascertain the validity of each, and thus at length to determine conclusively, *which* of them is *true*, and *which* is *false*.

And, the task is not so difficult as it might at first sight appear, from the voluminous mass of geological disquisition, the intricacy of the subjects which it embraces, and the hard words with which it has entrenched itself. We have no necessity to embroil our minds with all the multitudinous *details* of that disquisition, nor to obscure our language by its numerous exotic "*terminologies:*" we need only to extract the *root*, or *fundamental principle*, on which the bodies of the two geologies severally rest; to apply each to the *common test;* and afterwards, to abide by that geology, whose *superior validity* shall be established by the authority of that criterion.

To extract the *root* or *fundamental principle* of the *new geology*, is become a very easy operation, in consequence of the systematic order which it has at last acquired; it has now assumed a form of complete symmetry, and presents itself to our view in the unity of a well-compacted structure, with *root*, *trunk*, and *branches*. We have, therefore, only to direct our attention to *the root*, without pursuing the process of the trunk, or the ramifications of the branches; such as is the quality of *the root*, such also will necessarily be that of the process and ramifications which derive their substance and vitality from it. And, it will be immaterial to the general argument, in which of its two divisions we examine that *bifurcated root*; whether in the *neptunian* division, where the lobe is *aqueous*, or in the *vulcanian*, where it is *igneous*; because, the conclusions to which we shall be led by the one, will necessarily involve the other. Whatever diversity may appear to subsist between them, they will be found absolutely identified in their fundamental principle, which is this: *that sensible phenomena alone, are sufficient to reveal the* MODE *of primitive or* FIRST *formations.* Since, however, we must select one of the two for our immediate experiment, the *neptunian*; which boasts the venerable name of Werner[1], the

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[1] " Werner, distinguished by the early maturity of his talents; one
" of those geniusses which nature seems to have destined from their
" earliest years for the reformation of the sciences; was appointed to profess
" mineralogy in the very metropolis of that science, at Freyberg in
" Saxony (1775), the school of all Europe where the knowledge of minerals
" had most engaged the labours of many celebrated men (Agricola,
" Henkel, Lonheis, Charpentier, &c.)—Not only did Werner create that
" new branch of natural history to which he gave the name of *geognosy*;
' for from him, and from him alone, will date *positive geognosy* conversant
' in the mineral nature of the different strata,' says a very competent
" judge, M. Cuvier; but he moreover imparted to it, from that
" chair in which he professed it for thirty years, that astonishing impulse,
" which has caused it to make such rapid progress during these latter
" years.—From his lectures went forth a crowd of his pupils, Freisleben,
" Mohs, Esmark, d'Andrada, Raumer, Engelhart, J. Charpentier,
" Brocchi, &c.—Humboldt also and de Buch.—We may say of Werner
" what was said of Linnæus: 'The earth has been covered with his disciples;
' and, from one pole to the other, *nature* has been interrogated
' in the name of a *single man*.'"—D'AUBUISSON, tom. i. Disc. Prélim. p. xi.—xiv.

"*creator of geognostic science*[1]," seems, without a question, entitled to the precedency.

Although many skilful and eminent writers have contributed their assiduous labours to the edification of this science, yet it perhaps owes its fairest and most polished form, to a recent French geologist of the school of Werner; who, in the execution of his elaborate work, has displayed equal taste, ability, and integrity of mind. For although he has applied the powers of a superior genius to advance the progress of his science, and although he has given to those powers all the impulse of an enthusiastic ardour inspired by the grandeur of his subject, yet he has, at the same time, affixed to his treatise this honourable and upright profession: "My sole object is to propagate *the truth;* and I "should see with satisfaction any work which "should establish it, even if it should overturn any "of the assertions which I have believed, or which "I still believe, to be true. It was not a desire to "maintain or to gain converts to a system, that "induced me to take up my pen. I positively "adopt none; and if, in treating of mineral masses "and strata, I appear to follow an *hypothesis* with "respect to *the* MODE *of their formations,* it is, because such a method of proceeding appeared to "me simple, and well adapted for representing "facts, and connecting them together: much in

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[1] HUMBOLDT, *Superposition of Rocks,* p. 80.

"the manner of those philosophers, who, though "they are not convinced of the existence of a magnetic fluid, yet *suppose it*, in order that they may "be the better able to describe what takes place "in the different phenomena of magnetism[1]."

And, that this profession was as sincere as it is positive, the same writer affords many proofs; as when, though attached to the neptunian geology of Werner, he yet relinquishes its doctrine with respect to the origin of the basaltic formations of Saxony, in these ingenuous terms:—"The *facts* "which I had just witnessed spoke too plainly; "the *truth* was too manifestly exposed before my "eyes; I must either have absolutely resisted the "testimony of my *sight*, not to *perceive* it, or that "of my *conscience*, not to *declare* it[2]."

To such a dissertator we can, with confidence, address an argument which equally seeks for truth; nor shall I think it necessary to apologize, for the earnestness with which the great and important interests involved in the discussion may make me deem it requisite to conduct it. The disciple of Werner, who holds his mind in that state of subordination to *truth* that he is at all times ready to pass from the neptunian to the vulcanian scheme of geology, when the latter can exhibit proof that the balance of reason weighs on its side, must be equally ready to surrender the mineral geology altogether to the Mosaical, if this last should be found, after a trial of their respective authorities by some *common conventional standard,* to be that which can best endure the *test of the criterion.*

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[1] D'AUBUISSON, *Traité de Géognosie*, tom. i. Disc. Prel. p. 17.

[2] Ib. tom. ii. p. 603.

Now, it is not difficult to find such a *criterion;* because, the mineral geology proposes one for the trial of *its own* validity, and the Mosaical geology consents to submit itself *unconditionally* to the same: so that the whole operation will be reduced to the simple process of applying successively, to the *same standard,* the *root* or *fundamental principle* of the two geologies, with respect to the MODES *of the* PRIMARY *and* SECONDARY *formations of the mineral substances composing the crust of this globe.*

The *test* to which the mineral geology appeals, is *the reformed philosophy of* BACON *and* NEWTON; our object will therefore be, to ascertain, whether the *mineral,* or the *Mosaical* geology, can best endure the *trial of that test.* And, since the former, which challenges the trial, is of *very recent origin,* whereas the latter is of *very great antiquity;* it will be in propriety and order, that we should bring first to the test the quality of the *new pretender.* Let us therefore inquire— *What is Mineral Geology?*

CHAPTER II.

MINERAL GEOLOGY, as it is properly characterised by Cuvier[1], or, according to a more recent denomination, GEOGNOSY, is no other than *mineralogy*, or the *science of minerals*, attempting to determine, by the indications of *mineral phenomena alone*, the two *historical facts;* viz. *the* MODE *of the formation* of the primitive mineral substances composing this earth, and *the* MODE *of the changes* which those primitive substances have subsequently undergone.

That this is a true definition or description of this geology, is attested, both by the statements of its teachers, and by their reports of the history of its origin.

" *Geognosy*, said Werner, is that *part of Mineralogy* which brings us acquainted, in a me-
" thodical order, with the terrestrial globe in ge-
" neral; but especially, which brings us ac-
" quainted, in a particular manner, with the
" *positions* of the minerals which compose it:
" it reveals their relations, the nature of their

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[1] " *La Géologie Minérale.*" *Ossemens Fossiles, Disc. Prél.* p. 26.—*Theory of the Earth*, sect. 22. This latter treatise revised, forms the *Preliminary Discourse* of the former great work, of which a new edition was published in 1823. To that new edition the references are made in this present work.

"disposition, as well as that of the minerals themselves; *and* FINALLY, *it is able to conduct us to* NOTIONS *respecting their* FORMATION[1]."

In this definition, the first three points relate to *simple mineralogy*, topographical and tabular; the *last*, which respects the *historical question*, characterises the *Mineral Geology*.

"The principal object which geognosy has in view, (says the able disciple of Werner from whom I have just quoted[2],) is,

"1. The knowledge of the mineral masses, or rather of the different groups or systems of mineral masses, whose assemblage composes the solid portion of this terrestrial globe. It considers the mineralogical composition, structure and extent of each of these systems. It treats of their reciprocal dispositions, of the circumstances of their *superposition* one to the other, and of the different relations subsisting between them:

"2. *Of every thing which relates to* THE MODE *of their* FORMATION; and,

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[1] "Quoique la définition que Werner donne de la géognosie, en Allemand, ne soit guère susceptible d'une exacte traduction française, j'en hazarderai cependant la traduction presque littérale en disant:—'La *géognosie* est la partie de la minéralogie qui nous fait connaître, dans un ordre méthodique, le globe terrestre en général; et surtout qui nous fait connaître, d'une manière particulière, les gîtes des minéraux qui le composent; elle expose leurs rapports, leur manière d'être, ainsi que celle des minéraux qui les constituent; *et* FINALEMENT *elle peut nous conduire à des* NOTIONS *sur leur* FORMATION.'"—D'AUBUISSON, tom. i. p. 374. (*Définition de la Géognosie par Werner.*)

[2] D'AUBUISSON, tom. i. p. 1.

"3. *to* THE CHANGES *which they have undergone.*"

In this exposition, also, the first article describes *simple mineralogy;* the two latter articles, describe the same science converting itself into *Mineral Geology.*

If we consult the historical accounts of the origin and progress of this science, we shall find that they exactly answer to the preceding description. They relate, that the *experience* which had been acquired in a long course of *mineralogical practice,* the numerous observations which had been successively made by a series of able and acute *mineralogists,* and the light diffused over *mineralogy,* by the improvement and reformation of *chemistry,* engendered an ambition in succeeding *mineralogists* to advance beyond the mere investigation of the *actual properties and positions* of minerals, their *description* and *classification;* and to endeavour to detect, by means of *physical* principles, *the mode* by which they were *first formed,* and by which they were *afterwards altered in their circumstances.* And, it is this new and extraneous exercise of *mineralogy,* that properly constitutes the new science which is called *Mineral Geology,* and which assumes such exalted functions at the present day.

Thus, both the description of this geology and its history, as delivered by its most distinguished and zealous conductors, confirm the position; that it is no other than *simple mineralogy*, or the *science of minerals*, attempting to determine, by phenomena alone, two remote and extensively important *facts, pertaining to the* HISTORY *of this globe.*

The first thought which a consideration of these pretensions awakens in a reflecting and reasoning mind, is this question:—Can mineralogy be competent to determine, by means of *physical principles alone*, exclusively of all *historical aid or guidance*, the *matter of fact* in those points? Can it be competent, to "conduct us to *certain* "*notions*" respecting the *mode of the formation* of the primitive mineral substances of this globe? or, to "*decipher* the historical monuments of its "revolutions?" or, to "*compel* the primeval mountains to unfold the *secrets of their origin?*" or, to "trace and *ascertain* the causes of the changes "which have taken place in them?" For, the proper sphere of *mineralogy* is confined to the characters and qualities, that is, to the *actual sensible phenomena* of mineral matter; and, can *actual sensible phenomena alone* supply the means of determining, with the evidence which sound philosophy and sound reason demand, the *certainty of the two past facts in question?*

To this doubt, the mineral geology thus replies: that *it is competent* to determine these two *points of fact*, and, with all the evidence which reason and philosophy demand; that "*the happy* "*revolution effected by* BACON *and* NEWTON *in the*

" *studies of the natural sciences, was not experienced* " *in the science of geology until very late*[1];" but that, by employing the *method of induction* from " *observation and sound principles of physics, by the* " *rules of an exact logic*[2]," introduced by that happy revolution; and, by adhering to the rules taught, and practised, by those great teachers; it is able to reason, securely and conclusively, from the *sensible phenomena* of mineral matter, to *the* MODE *of its first formation* and *of its subsequent changes:* and that *man,* " who has weighed the " planets, and measured their distances, *may pre-* " *sume to trace the operations* by which the surface " of the globe *was arranged*[3]."

This, then, is *the test,* by which the mineral geology desires that its own validity should be tried. Let us, therefore, apply our close attention, whilst it professes to instruct us upon those two heads by the rules of *an exact logic,* and on *sound principles of physics;* and let us first hear it upon the *first head,* which constitutes *the* BASIS *of all geology,* viz. *the* MODE *of the formation of the* PRIMITIVE *mineral masses of the earth,* comparing it with the standard of BACON and NEWTON. The issue of the *first comparison,* will probably determine the degree of authority which it is entitled to command with respect to the *second head,* viz. *the* MODE *of the* CHANGES, *or the* REVOLUTIONS, *which those primitive mineral masses have undergone.*

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[1] " L'heureuse révolution, que BACON et NEWTON avaient opérée dans " l'étude des sciences naturelles, ne se fit ressentir que *bien tard* dans " celle de la *géologie.*"—D'AUBUISSON, *Disc. Prel.* p. 3.

[2] " L'observation, les principes d'une *saine physique,* et les règles " d'une *exacte logique.*"—Ib. p. 36.

[3] *Comparative View of the Huttonian and Neptunian Systems of Geology,* p. 2, 3.

CHAPTER III.

1. " FORMATIONS, (says the mineral geology,) " are the different assemblages of particular rocks " or soils, in which one and the same species " eminently prevails.—*These are the true* UNITIES " *in the mineral constitution of the globe; the deter-* " *mination of which, is the great object of geognosy*[1]. " —*Primitive,* or *first formations, are those mineral* " *formations which preceded the existence of orga-* " *nised beings*[2]."

2. " In considering the globe in its entireness, " and in fixing our attention upon its *figure,* " we shall find, that it is exactly such as a *fluid* " *mass,* endowed with *similar motion,* would have " *assumed;* and we shall be immediately *sensible* " *of its primitive fluidity*[3]."

3. " That the surface of the globe *has been in* " *a fluid state,* is established by very ample " *evidence*—which extends to the whole surface of " the earth, and *indubitably proves its former fluidity.* " —It is *proved,* that the whole surface of the globe " *has,* at one period, *been in a fluid state;* and, " that *from this has originated its present arrange-* " *ment*[4]."

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[1] D'AUBUISSON, tom. i. p. 322, 3.

[2] Ib. tom. ii. p. 3.

[3] Ib. *Introd.* p. 3.

[4] *Compar. View of Hutt. and Nept. Geol. Introd.* p. 3, 4, 5.

4. "There is a great class of rocks which lies "under every other, but never over any of them; "it is, therefore, the *oldest*, and, as far as we "know, the *first formed*. It is denominated the "*primitive* class. The rocks belonging to this "class have a *crystalline appearance, intimating, "that they have been precipitated from a state of "chemical solution*[1]."

5. "*Crystallisation*, is the arrangement of the "particles of a body in a regular determinate "form; and it *necessarily implies a previous state "of fluidity*, which would *allow* these particles to "*arrange themselves* in positions necessary to produce these forms[2]."

6. "As we advance towards the lofty summits "of mountains,—we arrive at strata, which shew "by their crystallisation *that they have been formed "in a fluid*[3]."

7. "The superficial parts of the earth, at "least to a certain depth, *must* have been originally in a *soft* or *fluid* state. This fact is "*inferred* from the *shape* it at present exhibits; "which, as *astronomers* tell us, is that of a "*spheroid compressed at the poles.* This shape it "evidently *could not assume*, unless to a certain "depth its superficial parts were in a soft and "liquid state.—The liquidity *thus proved to exist* "in the more superficial parts of the globe, com-

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[1] JAMESON's *Mineralogy*, vol. iii. p. 67.

[2] *Comp. View of Hutt.* &c. p. 4.

[3] CUVIER, *Disc. Prélim.* p. 10.— *Theory of the Earth*, § 7.

" prehending those that are now most solid, *must*
" have proceeded, either from *igneous fusion* or
" *solution in water*[1]."

8. " The different masses and strata, which
" compose the mineral shell of the terrestrial
" globe, *have been fluid:* the fact is not contested,
" it is *incontestable*[2]."—" The *spheroidal figure* of
" the earth is *a proof of its original fluidity:* this
" important conclusion was *never disputed;* the
" *only* question has been, whether the fluidity was
" the effect of *fire* or *water*[3]."

9. " It is *beyond all doubt,* (says the *aqueous*
" side of this geology,) 1. that the mineral masses
" which compose the crust of the globe *have been*
" *fluid.* It is not less certain, 2. that the fluidity
" of *secondary* formations was *aqueous;* and that
" they were formed in the bosom of the seas by a
" course of *sediments,* which successively deposited
" themselves one upon the other. And, 3. that
" the insensible and incontestable *transition of the*
" *secondary to the primitive formations,* indicate an
" *analogous mode of formation in* ALL[4].—Some very
" distinguished natural philosophers have lately
" contested this mode of formation, (viz. the *nep-*
" *tunian,* or by the *action of water);* and have
" endeavoured to substitute for it another, (viz.
" the *plutonian* or *vulcanian,* or by the *action of*

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[1] KIRWAN'S *Geol. Essays,* p. 7.
[2] D'AUBUISSON, i. 379, 380. Note.
[3] JAMESON, iii. c. 5. p. 10.
[4] D'AUBUISSON, i. p. 388.

" *fire);* but, these anomalous theories appear to " be *mere oscillations,* which the progress of our " geological knowledge experiences in its positive " progress towards *truth*[1]."

10. " The first *essential* step which has been " made in this course of pursuit, has been the " general conclusion deduced from the assemblage of *facts,* after a long course of observa- " tions; that *all* the substances which compose " our mineral strata, *must have originated from* " *chemical combinations in an aqueous liquid*[2].— " There was at first upon our globe, neither *men-* " *struum* nor *solvend;* a *confused assemblage of ele-* " *ments—un assemblage confus d'élémens—formed* " *itself* in a liquid, of which *water* was the basis; " and it is from this first mixture, that *all sub-* " *stances whatever,* which engage our observation " or experience, successively *formed themselves*[3]. " —All *enlightened* geologists, now agree; that all " the substances which compose our strata, *must* " *have been, at one time, contained in the same liquid,* " *from which they were successively separated by a* " *chemical process*[4]."

11. " The PRIMITIVE *soils, whatever was the* " *mode of their formation and consolidation, were* " NOT *formed or consolidated at the* SAME INSTANT: " *there was* NECESSARILY *a succession of time*[5]."— " Let us carry ourselves, *in idea,* to the *first mo-*

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[1] D'AUBUISSON, t. i. p. 389. [2] DE LUC, *Lett. Géologiques,* p. 111, 112.
[3] Ib. p. 120. [4] Ib. p. 384. [5] D'AUBUISSON, t. ii. p. 4.

"*ments of the formation* of that part of the globe "which is known to us; that is, of the thin rind "or crust which covers our planet.—At that "epocha, the part of the globe which was then "actually existing, *was* like a kernel surrounded "by the *elementary principles* of the minerals of "which its rind or crust is now composed. We "*can represent to ourselves* those principles, as "suspended in *a vast dissolution;* whatever else "might have been its nature[1].—This CHAOTIC "OCEAN[2]—or, '*original* CHAOTIC FLUID[3],'— "*very different from our present seas,* contained the "*elements of the primitive earths.* In obeying the "laws of *the affinity of composition,* they coalesced, "and *grouped themselves* together in different manners; and they thus *produced the integral molecules* of the different minerals. This *was* the "*first,* or *chemical structure.*

12. "Causes *which are unknown to us,* having "occasioned the precipitation of these molecules, "they successively *deposited themselves,* uniting "by the *laws of the affinity of aggregation;* and they "formed our *minerals.* From this *second* or proper "*mineralogical structure,* are derived the different "particularities which minerals present to us in "their texture and fracture.

13. "*At length* the minerals formed, by their "assemblage, the masses or rocks, and the strata "or soils, the aggregate of which constitutes the

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[1] D'AUBUISSON, tom. i. 270. [2] Ib. 355. [3] KIRWAN, p. 11.

" solid crust of the globe. The disposition of the " minerals in their masses, of the masses in their " strata, of the strata in the formations which sub- " divide them, and lastly, of the formations with " relation to each other, constitute the *geognostic* " *structure*[1].

14. " The *first formations* were produced by a " *general cause*. We can *represent them to our-* " *selves*, as precipitations from an universal dis- " solution, that is to say, from a dissolution which " covered the whole terrestrial globe. But, " although the dissolution *was general*, it will " not follow that every precipitate was such, and " that each formed originally a stratum which " enveloped the whole globe. While the dissolu- " tion deposited one substance, or one rock, in " one place, it is *very possible* that it produced no " precipitate of the same species in another; " either because the constituent principles of the " rock were not in sufficient quantities in that " part of the dissolution, or because the causes of " the precipitation did not there exercise their " action, or lastly, because other causes ob- " structed them. In this place, they deposited " *granite;* and a little further, *micaceous schist,* " because the elements of *mica* were, *perhaps,* in a " greater quantity in that part of the dissolution " which covered the latter place[2].

15. " When the observer enters into the de-

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[1] D'AUBUISSON, i. 271.

[2] Ib. i. p. 326, 7.

" tails of the *formation* of minerals, *he sees nothing* " *but precipitations, crystallisations,* and *dissolutions.* " The *powers which produced* the minerals, and " which collected and united their elements, *were* " *the powers of affinity.* He will not be able to " appreciate correctly their effects, without a pro- " found knowledge of *general chemistry.* But, he " will stand in need of great reserve and dis- " crimination, when he would conclude, from " what takes place in our laboratories, to that " which takes place in *nature. Nature,* acts upon " immense masses; *she,* has *time at her disposal,* " it is nothing to *her;* and, these *two circumstances* " will often be sufficient to render entirely dis- " similar, the effects of the same agent, and " the products of the same cause.—*Time,* which " has such narrow limits for *us,* has *none at all for* " *Nature;* for *her,* it is as indefinite as *space:* " both of these exceed even the conception of our " imagination[1].—It is further to be observed, " that we cannot flatter ourselves with *being able* " *to know all the means which Nature employs in her* " *formations;* and we are not to conclude, that an " effect is impossible to *her,* because we have not " been able to produce it in our laboratories; for " instance, we are not to conclude that a given " substance is undecomposable, merely because " we have not been able to decompose it[2].

16. " It will be sufficient to recollect—that

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[1] D'AUBUISSON, tom. i. p. 241, 2.

[2] Id. *Disc. Prél.* p. 30.

" *the science of physics* makes known to us the *laws* " *which appear to govern matter;* and that, by continually keeping before our eyes the *phenomena* " *of Nature* and the *causes which produce them,* it " renders us competent to apprehend and form a " just notion of the relations which may subsist between *the effects we see* and *the causes* to which *we* " *are led* to attribute them—in order to be sensible, " how necessary this science is to those who apply " their thoughts to the revolutions of the terrestrial globe, and who endeavour to account for " the changes which its surface experiences, or " has experienced[1].

17. " It is principally, I repeat it, the progress " of *chemistry,* that has conducted us to *this general* " *conclusion,* from whence at length has resulted *a* " *solid* BASIS *for geology*[2].—*General chemistry,* " ought here to be our *only guide as to principles;* " and it is but *very lately,* that it has supplied us " with *true lights* with respect to these[3]."

Thus, the *Mineral Geology* concludes, from the *crystalline phenomena* of the earth, that it was originally " *a confused mass of elemental principles,* " suspended in a *vast solution, chaotic ocean, or* " *original chaotic fluid;*" which, after an unassignable series of ages, " *settled themselves*" at last into the order and correspondence of parts which it now possesses, by a gradual process of " *preci-*

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[1] D'AUBUISSON, *Disc. Prél.* p. 30. [2] DE LUC, *Lett. Géol.* p. 112.

[3] Ib. p. 111.

"*pitation* and *crystallisation*," according to certain "*laws of matter*," which it denominates "the laws "of *affinity of composition and aggregation*;" and that they thus formed successively, though remotely in time, 1. a *chemical*, 2. a *mineral*, and lastly, a *geognostic*, which is its *present*, structure; and, that it was during this long process, and before it attained to its present solidity, that *the earth acquired its peculiar figure by the operation of the physical laws which cause it to revolve upon its axis*. This is that *root* or *fundamental principle* of the *mineral* geology, which we were to extract, and to try by *the test* of the reformed philosophy of Bacon and Newton. The *igneous geology*, which would substitute a primitive "*amorphous paste*" for a primitive "*chaotic fluid*," stands precisely on the same ground as the *aqueous geology*, with relation to the present argument.

If the foregoing conclusions are the genuine fruits of that *reformed philosophy*, we shall of course find them to be in entire and perfect concord with the conclusions of Bacon and Newton upon the same subject; since, the mineral geology professes to deduce them by the method of *induction*, "from "observation and sound principles of physics, and "by the rule of an exact logic," introduced by that philosophy.

Bacon and Newton certainly taught, both by doctrine and example, the method of philosophising by *analysis* and *induction*; and it was that method, skilfully and rigidly observed by them, that produced and constituted the "happy revo-"lution in the studies of the natural sciences," which the mineral geology so justly eulogises. But, was there not a *caveat* which Newton annexed to his process of *induction?* "The method "of *analysis*," said he, "consists in making expe-"riments and observations, and in drawing general "conclusions from them by *induction;* and, in "admitting no objections against the conclusions "*but such* as are taken from experiments, *or other* "*certain truths*[1]." There were, then, some "*cer-*"*tain truths*," which had always authority, in Newton's philosophy, to govern and regulate the process of induction; and even to oppose "*ob-*"*jections*" to general conclusions, if these betrayed any *defect in the analysis* from which they were deduced: for, the analysis must be *complete*, before the induction can be *conclusive*. If, therefore, any *certain truths* were disregarded, and if the induction still persisted in going forward in despite of them, it necessarily departed from philosophy and truth exactly in the same *ratio;* and only wandered, further and further, into the wilderness of fiction and error.

And, what are the "*certain truths*," which, in consequence of a manifest evidence of *original defect in the analysis*, have been crying out by the mouth of Newton during the last ten pages, to the headlong and unheeding progress of the mineral geology—*Siste!*—*Halt!* They are these:

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[1] *Optics*, lib. iii. in fin.

" It seems probable to ME, (said the wise and
" circumspect Newton,) that GOD, *in the beginning*, formed *matter* in solid, massy, hard, impenetrable, moveable particles, of *such sizes and figures, and with such other properties, and in such proportions to space, as most conduced to the* END *for which* HE *formed them.—All material things* seem to have been composed of the hard and solid particles above mentioned, *variously associated in the* FIRST CREATION *by the counsels of an* INTELLIGENT AGENT. For, it *became* HIM *who created them to set them in order*; and, if HE did so, it is *unphilosophical* to seek for any other origin of this world, *or to pretend that it might rise out of a* CHAOS *by the mere laws of Nature*; though, being *once formed*, it may *continue* by those laws for many ages[1]."

This is the *test*, to which we were to bring and apply the *root* of the *mineral* geology. Now, it must be evident to every plain understanding; that the mundane system which supposed the earth to be at rest on the back of a tortoise, is not more fundamentally in opposition to the planetary system of Newton, than the conclusions of the mineral geology which we have just read, concerning *the* MODE *of first formations*, are in opposition to the conclusions of Newton upon the same subject; which conclusions constitute the *basis* of his philosophy.

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[1] *Optics*, lib. iii. *in fin.*

The "*confused assemblage of elements or chaotic* "*ocean*,"

instabilis tellus, innabilis unda,

from which the mineral geology would derive the figure, symmetry, beauty, and accommodation that we "observe and experience" in this earthly system; is no other than the "CHAOS," which Newton has expressly and pointedly rejected and reprobated. The operation which he entitles "*the* "*setting in order*," is the very same which the *mineral geology* describes as "*the forming successively a chemical, a mineral, and a geognostic* "*structure*." That operation, Newton ascribed to the *immediate intelligence and operation of God;* the *mineral* geology attributes it to *general chemistry*, and to certain *laws of affinity* acting through a long succession of ages,

Donicum ad extremum crescendi perfica finem
Omnia perduxit rerum *Natura creatrix*[1].

Till all things, to their end of growing brought,
Creative Nature in perfection wrought.

Newton emphatically, and as it were by a prophetical judgment, pronounced this conclusion of the *mineral geology* to be "*unphilosophical;*" and therefore, essentially contrary to that which alone he acknowledged to be *philosophical*, according to the principles of his own philosophy.

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[1] LUCRETIUS, ii. 1115.

This judgment, indeed, chiefly affects the *neptunian* system; but, he has not altogether forgotten the *plutonian*, which perpetually replaces a *perishing system* of the globe with a *new* one, by "the "mere laws of nature:" "The growth of *new* "*systems out of old ones*," says he, "without the "mediation of a DIVINE POWER, seems to ME "apparently absurd[1]." Neither will "the *new* "geogony, which (we are told) has a *tendency to* "*lean to the idea* of the liquified masses ascending "from below upwards, whereas the *ancient* geo-"gony explained every thing by precipitation, "and movements in an opposite direction[2]," escape any better from the overwhelming weight of Newton's condemnation.

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[1] *Third Letter to* BENTLEY.

[2] HUMBOLDT, *Superpos. of Rocks*, p. 414.

CHAPTER IV.

SOME very recent and eminent geological writers have adopted the course, of prudentially excluding from their disquisitions all consideration of the ' unphilosophical" or "absurd" speculations on *the* MODE *of primitive formations,* which we have just witnessed; but then, they have at the same time excluded all consideration of the *question itself,* leaving their geologies without any *basis* or *root,* and standing among the other systems of human science, as the *air-plant* stands among the *rooted systems of vegetation.* Such mere *exclusions,* are but weak and timid *evasions* of a question of primary and fundamental concernment to the *truth of geology;* and leave the mind in ignorance of that truth, and consequently, the adverse error free to extend its operation in unresisted, because in unregarded, progress. The question, of *the* MODE *of primitive formations,* is essential to geology; and may not be *excluded,* merely because some theorists have proposed "*unphilosophical*" or "*absurd*" solutions of it: we are not, therefore, simply to *exclude* those solutions, but we are to *replace them* with a solution which shall be conformable to *philosophy* and *sense.* There is a *third* course, besides losing our way in a fog, and standing still in a fog; and that is, to get out of it, and above it, into a clear and luminous atmosphere. The authors of the speculations, follow the first course; they who merely *evade them by silence,* follow the second course: the third, is open to those who resolutely rise above them into the brightness of authenticated truth, and who are thus enabled to see and observe the whole circuit of the cloud in which the others remain involved[1]. The first of these, build their geological structures on a *false foundation;* the second, build them on none—*in the air;* the third, will found them in an *immoveable rock,* whose solidity is susceptible of demonstration.

It will, therefore, be important to the prosecution of our inquiry into *the* MODE *of primitive formations,* to investigate preliminarily, with some minuteness, the *ground* of the opposition of doctrine between the philosophies of Newton and of the mineral geology, respecting a *chaotic* or *fluid state of this globe;* and to observe, *how deeply* the foundation of that opposition is laid.

When Newton had remarked, that the planets present to the sight figures of *obtuse spheroids,* and not of *perfect spheres;* when he had reflected upon the *nature* and *properties* of that peculiar figure, and had contemplated those orbs as subjected, in their revolutions, to the *adverse* actions of *gravity* and *centrifugal force;* his penetrating mind at length discovered, that *the rule of harmony and equilibrium between those two contending powers,* was only to be found in *the figure of an obtuse spheroid.* To render this fact plain to the understanding of others, he imagined this *hypothetical illustration.*—"*If,*" said he, "*the earth were formed of an uniformly yielding* "*substance, and if it were to become deprived of its* "*motion,—si terra constaret ex uniformi materia, mo-* "*tuque omni privaretur*[1];" the law of *gravity,* acting equally, and without resistance, from all points of its surface *towards its centre,* would cause that yielding substance to settle into the figure of a *perfect sphere.* But, *if it were* then to receive *a transverse impulse* which should cause it to revolve upon its axis, the new transverse force would counteract the former force of gravity, by urging the particles composing the yielding substance *from their centre towards their circumference;* and, would thus produce an *alteration in the figure of the sphere.* For, the new force would tend to *elevate* the surface, and would have most power at the *equator* and least at the poles; whereas, the opposite force of gravity would tend to *depress* the surface, and would have most power at the *poles* and least at the equator. The result of this *inequality of gravitation,* must necessarily be; that the original *sphere* becoming elevated at the equator, but not at the poles, and the elevating power gradually diminishing from the equator to the poles, its figure would be *eventually changed into that of an obtuse spheroid.*

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[1] The Reviewer of D'Aubuisson's *Traité de Géognosie* in the *Bibliotheque Universelle,* passes over the first part of that work, deeming it, as it would appear, *too speculative.* Yet, its *speculation* is directed to one of the sublimest and most important objects that can engage the intellect, viz.—*the* MODE *of primitive formations.* That object, however, the Reviewer lets pass *sub alto silentio;* without an attempt to extricate himself from the cloud, in which it is manifest he feels himself involved.

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[1] *Princip. Math.* lib. iii. *prop.* 19. *prob.* 3.

It being thus shewn, that such would be the necessary result of the *compound power* of gravity and centrifugal force; it followed, that those two antagonist forces, acting at the same time in the earth *supposed to be formed of an homogeneous and uniformly yielding substance*, would work themselves into *harmony and equilibrium* by producing that figure; which they should thenceforward maintain. Whereas, if we suppose the case of a *true sphere*, which should consist of a *solid and resisting* substance; the two forces must act in *perpetual and violent discord and conflict*, with a *constant tendency to disunite and rend the texture of the fabric.* Now, Newton, maintained, "that GOD at the beginning "formed *all* material things, (and therefore *this* "*earth* which is one of them,) of *such figures and* "*properties as most conduced to the* END *for which* "HE *formed them;*" and, having demonstrated, that the property of an *obtuse spheroid* was that *which most conduced to the* END *for which God formed the earth*, he left it to the capacity of every one to draw the obvious inference, in conformity to his known principles,—viz. *that it is highly probable, that God has formed the earth with the same figure which it is manifest* HE *has given to the other planets, and for which an* ADEQUATE REASON *is thus rendered plain to the intelligence.* And he confirmed this argument of *probability*, by superadding the *experimental proof*, that, unless the earth *was actually flatter* at the poles than at the equator, the waters of the ocean, constantly rising towards the equator, must long since have deluged and overwhelmed the equatorial regions, and have deserted the polar; whereas, the waters are now retained in equilibrium over all its surface. Such was the whole nature, design, and extent, of Newton's proposition and demonstration. And, so his accurate expounder drew his inference: "What we have "said of *a fluid earth*, must hold of the earth *as it* "*is;* for, if it had not *this figure* in its solid parts, "but a *spherical figure*, the ocean would overflow "all the equatorial regions, and leave the polar "regions elevated many miles above the level of "the sea; whereas we find, that one is no more "elevated above the level of the ocean than the "other[1]." It did not enter into his head, any more than it did into Newton's, to draw from this demonstration the *geological conclusion;* that "our "globe was once REALLY *fluid*."

But, the illustration inspired the mineral geology with peculiar satisfaction. Without making any reference to the *principles* and *conclusions* of Newton's philosophy, or to the *object* for which alone he designed the illustration; it seized upon his *hypothetical plastic sphere*, and transformed his *philosophical demonstration* into a *geological propo-*

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[1] MACLAURIN, *Account of Sir Isaac Newton's Phil.* p. 364.

sition. That supposed sphere, bore too convenient and desirable a resemblance to the "*chaotic fluid*" or "*confused mixture of elements,*" not to be eagerly realised, and identified with it by the mineral geology; which imagined, that it could thus argue the *original fluidity* of the earth, and its *consequent obtuseness,* and appeal to the authority of the "*Principia Mathematica*" for a *Chaos.*

"The spherical figure of the earth (it said) "had, for a long time, *suggested the idea that its* "*mass had been fluid,* at least to a certain depth; "*Newton, setting out from that idea—Newton, partant de cette idée*—joined to the rotatory motion "of the globe, found that its diameter at the poles, "must be to its diameter at the equator, as 229 "to 230. Now, we find in the *Philosophical* "*Transactions* of the Royal Society of London, "for the year 1791, a memoir by M. D'Albi, in "which, discussing the sum of the results of the "measure of a degree of the meridian in different "latitudes, he finds that *this determination of* "*Newton* is confirmed by experiment, as far as "this latter method of determination could extend. "*We thus, therefore,* KNOW, *that our globe* REALLY "WAS *once liquid,* at least to a certain depth; and, "that when it acquired its solidity in the portion "essential to its form, it had the same sensible "velocity of rotation, which it has now[1]." And again: "The earth *was covered* with a *liquid con-*

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[1] DE LUC, *Lett. Géol.* p. 81.

" *taining the substances of our mineral strata.* It " was *then*, that by a movement of rotation, con- " tinued sensibly thenceforward in the same de- " gree, *the earth received the spheroidal figure* which " it has been found to possess by the observers of " this age, *and which Newton had proved by its* " *motion*[1]."—" The *neptunian system*, only con- " siders the earth to have had a spheroidal shape, " *when it was in a fluid form*[2]."—" We find a si- " milar figure in the other planets; and, with the " exception of some irregularities resulting from " particular causes, their obtuseness is more con- " siderable in proportion as their movement is " more rapid; as ought to be the case, accord- " ing to the laws of equilibrium in fluids:— " a *manifest proof*, that the obtuseness of the " planets is an *effect*, of their rotatory motion; and " *consequently—par conséquent*—that the planets " *were originally fluid*, at least in their surfaces[3]." And it concludes: " *Since the earth has* that " spheroidal form, which its motion of rotation " *ought* to produce in a liquid mass, *it follows ne-* " *cessarily, that it must have been fluid*[4]."

Thus reasoned the mineral geology, to fortify itself with the support of Newton's illustrious name. But, Newton did not " *set out from any* " *such idea*," as that " *the mass of the earth had*

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[1] DE LUC, *Lett. Géol.* p. 81.

[2] JAMESON'S *Mineral.* vol. iii. p. 10. *Note.*

[3] D'AUBUISSON, tom. i. p. 23, 24.

[4] DE LUC, Ib. p. 107.

" *been really fluid.*" The mineralogist's *real fluidity of the earth*, and Newton's *supposed equally yielding substance*, have nothing whatever in common; neither identity of origin, nor congeniality of nature. And indeed, the geologist last quoted, in a brighter period of his lucubrations, " refrained from deciding; whether our globe *assumed its present obtuse figure in consequence of having been once fluid*, or, whether it *immediately received that figure at the* CREATION, *as being most convenient*[1]." Although, even at that moment of hesitation, he was far from the philosophy of Newton, who had already concluded the *latter;* yet, his judgment might still have fallen into coincidence with that philosophy. But, he at length concluded on the side of the mineral geology, against Newton; maintaining, that our globe " *was once really a fluid*, constituting a *chaotic liquid*, out of which " the whole mechanism of its wonderful structure " *rose by the mere laws of nature.*"

Had Newton conceived, that his illustration was liable to such *perversion*, and that it would have been thus *distorted* to prop a doctrine from which he was abhorrent, which he emphatically disclaimed, and which he pronounced to be " *unphilosophical;*" we may be assured, that he would not have instanced of *this earth* particularly, but of *any ball* consisting of moist, homogeneous, and yielding matter, such as *softened clay*, which would have equally supplied the illustration that he intended. But, his exalted mind, being conversant with the planetary orbs, drew his example from them; incautiously, and too confidently, as it would now appear. His sole design, was to render intelligible, and sensible, the *compound effect of two known adverse forces*. That he did not *suppose* that the earth had ever *really been fluid*, and that it had *settled itself by laws of matter* into its present figure; is proved, both by the *object* and *hypothetical form* of his proposition, and by his express ascription of its "*figure and properties*," as of those of *all first formations*, to the intelligent counsels and creative act of God, *immediately*. His own words, were sufficient to have preserved his proposition from the perversion which it has experienced; for, he states it in different modes, by which his intention is cleared from all ambiguity. He does not only argue, "*if the earth were* "*fluid*," &c.; but he also argues, "*if all circular* "*diurnal motion were taken from the planets*," &c.; "*if all matter were fluid*[1]," &c. That these were only different *hypothetical propositions*, employed to illustrate the same principle, is thus manifest to every capacity.

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[1] " Sans décider, si c'est pour *avoir été fluide* dans son origine, que " notre globe a pris la forme qu'il a aujourd'hui; ou, s'il a reçu immédiatement cette figure à la CREATION, comme étant la *plus convenable.*" —*Lettres sur l'Hist. de la Terre*, tom. ii. p. 154.

And, when we can demonstrate to our intelligence by means of the illustration, that the figure of an *obtuse spheroid,* is that which alone can *produce harmony between two adverse but requisite forces acting in the same globe;* why are we not rather to assume, with him, that such a figure was *given to it at its origin with a view to that harmony,* provided we acknowledge with him an *Intelligent Agent,* than to conclude, with the mineral geology, that it was left to *produce itself, as the ultimate issue of a long, rude, and violent conflict between the two forces?* Such, however, are the *opposite conclusions* of the two philosophies; the one, concluding from the figure of the earth to an intelligent and immediate act of *God;* the other, to the tardy and progressive action of a *chemical menstruum.*

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[1] *Princ. Math.* lib. iii. *prop.* 18. *theorem* 16.

" The *several planets are spheroidal* like the " earth, *therefore they have been fluid*[1]." I fear that this argument would not be held *secundum artem,* in the schools. " Let the earth, (it further argues) " be *supposed fluid* to a certain depth; *then,* the " statical figure which it would assume in conse- " quence of rotation on its axis, would be that of a " spheroid flattened at the poles. Such, or nearly " such, *being* the figure which *it has assumed,* we " have *good reason* to believe *from this circum-* " *stance,* that the earth *has been more or less fluid* " to a certain depth[2]." No doubt, if we were sure that the earth *did assume* that figure, we should have the best reason to conclude of its primitive fluidity; but, here also the *logic* needs revisal; for, the previous question is, whether it *did assume* that figure, or whether it *received it from an intelligent cause, and with a view to a particular end;* in which latter case, we cannot possibly conclude to its *primitive fluidity.* The *latter,* is the conclusion of *Newton;* the *former,* is that of the *mineral geology,* which it calls, "the *great fact*— "le *grand fait,*" from which results "the proposition *fundamental to geology;* viz. that the *epocha,* "when all the operations whose monuments are "before our eyes began upon the earth, is *characterised by an immediate chemical circumstance,* "namely, *the original liquidity of the globe*[1]."

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[1] GREENOUGH'S *Geology,* p. 172.

[2] Id. p. 91.

Thus, both from *crystalline character,* and from the *obtuseness of spherical figure,* the mineral geology concludes to *Chaos;* whereas, from both of these, Newton concluded to GOD.

But, what is least to be tolerated in this perversion, is, that after thus misapprehending and misrepresenting Newton's illustration, it proceeds to find *him guilty of error in it.* "Newton," it "says, "*supposed* that the mass of the globe *was* "*homogeneous in density,* and that *its figure, in* "*flattening itself, became an ellipsoid.*—Maclaurin "demonstrated the legitimacy of the second of "*Newton's two suppositions,* the *ellipticity* of its "form; with respect to the other, that of its "*homogeneity,* Clairault *shewed that it was inadmissible, by proving that it is denser in its interior*

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[1] DE LUC, *Lettres Géol.* p. 81.

"*than at its surface*[1]." But, did Newton require the earth's homogeneity to be *admitted as a fact?* Clairault might have spared his pains, so far as they related to the *refutation of Newton.* Newton indeed *supposed*, that is, *proposed* the case of the earth's homogeneity, as a *philosophical hypothesis* in order to a particular demonstration; but, where did Clairault discover, that he *supposed* it, that is, *assumed* it as a *geological fact? or*, **that** he *supposed* the earth to have *really flattened itself into an ellipsoid?* Such conceptions, never held a place in the intellect of Newton. After rectifying Newton's alleged *error*, however, by the sagacity of Clairault, the mineral geology thus proceeds to draw out the *consequence* of Newton's alleged *supposition.*

"We have seen, that the flatness of the earth "is such as is indicated by the laws of hydro-"statics; that is, that the earth has exactly the "same figure which it should have, if it had been "originally fluid. *By what singular* CHANCE[2], *if it*

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[1] D'AUBUISSON, i. 17.

[2] "*Par quel singulier* HASARD, *si elle eut été toujours solide, aurait-"elle eu une forme si extraordinaire, &c.?*"—I am tempted to introduce here, a remark from a former work: "It is deserving of our most serious "consideration, though it is not adequately pointed out for attention, "that *Homer* recognised no such agency in the universe as τυχη, "*Chance;* and, that the word τυχη does not once occur, either in the "Iliad or in the Odyssey. Eustathius informs us, that the ancients had "made the same observation; and Macrobius, who also points it out, "and observes, that Homer *ascribed the government and direction of all "things to* GOD ALONE—SOLI DEO *omnia regenda committit;*" adds: "*Virgil*, on the contrary, acknowledges *Chance*, or *Fortune*, therein

" *had always been solid, could it have had so extra-*
" *ordinary a form;* which is a necessary conse-
" quence of the properties of fluids, and which
" seems to pertain to them exclusively? The *fact*
" is, it *has moulded itself into this singular form:*
" and, in order to have been able to do so, its
" *molecules must, in all necessity,* have been ori-
" ginally independent of each other, that is, *they*
" *must have formed a fluid mass*[1]."

This example, therefore, demonstrates how widely the mineral geology stands apart from the philosophy of Newton. We have no need to proceed further to shew, that it has failed under its own test; and, therefore, that its conclusions, with respect to *the* MODE *of first formations,* are fundamentally erroneous by that rule: the proof of its *essential discordance with the test,* being technical *conviction of its error.* So far, therefore, is " the happy revolution effected by Newton in the " studies of the natural sciences" from having been experienced " *late in the science of mineral* " *geology,*" that it is evident, that it has not been experienced in it *at all.* It may have been experienced in some of its *subordinate* arguments;

" departing, either casually or intentionally, from the *Homeric sect.*"—(*Exam. of the Prim. Arg. of the Iliad,* p. 226.) But, between the times of Homer and Virgil, Epicurus had speculated, and Lucretius had chanted his speculations; and, as these tinctured the *philosophy of Virgil,* so do they still tincture *our physical philosophy.* How else can we explain, the *essential opposition* of the extraordinary question above asked, to the great principle of Newton's philosophy?

[1] D'AUBUISSON, i. 23.

but, subordinate arguments are here very subordinate considerations. In philosophy and science, we have regard *first*, to *first principles*; and, certainly, there is no savour of the *philosophy of Newton*, in the *first*, *fundamental principle*, or *root* of the *Mineral Geology*.

But it will be highly important that we should proceed further with this subject, and that we should investigate the *cause* of this extraordinary discordance; in order that we may ascertain, precisely, how it has come to pass, that the *mineral geology*, whilst it professed, and whilst it really intended to follow the method of *analysis* and *induction* taught by Newton, should nevertheless have concluded in *direct contradiction to him.*

It will probably say, that it draws its conclusions from a series of *facts* and *observations* which were wholly unknown to the age of Newton; that, if Newton had lived to *witness* the vast progress that physical science has made in *mineralogy* and *chemistry* since his time, and to *see the phenomena* that determine its conclusions, he would have changed *in toto*, or, at least, would have very materially *modified*, his own conclusion. But, I reply; that it could only urge that plea, by continuing under the same fatal misapprehension of Newton's principles, which has already caused it to conclude in contradiction to him. Those *principles*, with relation to the great question with which we are engaged, are not alterable by any possible contingency, any facts or observations, any *sensible phenomena* that can occur, in the progress of the *physical sciences*. They are derived from a far higher science; a *paramount science*, which must ever govern and control them all. His "*rules of philosophising*," though prefixed and immediately applied by himself to the mathematical science, are not, therefore, exclusively *mathematical;* they are *general rules*, deduced from that *universal science* which Bacon denominates "*prima philosophia*," viz. the science of *universal logic*, that is, of *universal and immutable* REASON[1].

The mineral geology, confidently reposes on its delusive error, that he who *sees most, judges best;* and it expects, by that rule, to secure the palm in every geological contest. As if *judgment*, were the necessary product of *vision*. But, as the two faculties have no such necessary ordination and dependence; he who sees *enough*, with a *more instructed* judgment, will better apprehend the fundamental truths of *geology*, than he who sees *more than enough*, with a judgment *less instructed*.

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[1] *Regulæ philosophandi:*—Reg. 1. "More causes of natural things "ought not to be admitted, than are true, and sufficient for explaining "their phenomena.

Reg. 2. "Therefore, to natural things of the same kind, the same "causes ought to be assigned; as far as it is possible.

Reg. 3. "Qualities of bodies which cannot be increased or lost, and "which pertain to all bodies that we can subject to our experiment, "are to be accounted qualities of all bodies, universally.

Reg. 4. "In experimental philosophy, propositions, drawn from "phenomena by induction, are to be accounted as *true*, either strictly, or "nearly approaching to it, until other phenomena occur, by which they "may be rendered either more accurate, or open to exceptions."

It is one thing to *accumulate data*, and another thing to *reason soundly* upon them when accumulated: as will be frequently exemplified in the progress of this work. There is occasion for the *ne quid nimis* in geology, as well as in morals. There is a mental habit of prosecuting *sensible details*, which discapacitates the mind, in the same proportion, for the exercise of *intellectual generalisation*. Certainly, he who has read numerically *most books*, is not necessarily the *best critic;* and, by the same principle, he who has seen numerically *most rocks*, is not necessarily the *best geologist*. The mental eye, like the corporeal, must find the just point of visual distance, before it can embrace *the whole* of the object on which it looks, and apprehend the *relations of its parts;* and, the mineral geology is *constitutionally averse* to remove itself to that necessary distance from the inspection of *its mineral phenomena*. Although, then, it is undeniably true, " that those who have con-" tributed most to the advancement of Natural " Philosophy, have had, at the same time, a *ten-" dency to generalise*, and an accurate knowledge " of *a great many particular facts*[1];" yet, it was not the *tendency*, but the *sound ability*, that enabled them to contribute to that advancement.

The science of *mineralogy*, valuable as it is within its own proper sphere, is, in itself, only a *physical* science—viz. the *science of mineral characters*

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[1] HUMBOLDT, *Superp. of Rocks*, p. 32.

and mineral qualities; and, if it reasons wrong within its assumptive sphere of *geology,* it can never transmute its false reasoning into true reasoning, by virtue of any *physical* resources of its own: whereas, Newton's philosophy being essentially *logical,* that is, *rational,* possessed always a rectifying and conservative principle in itself. In Newton, intuitive *logic* was dominant; and *mathematics,* were only the steps by which his *logic* ascended to the elevation to which it attained. In the mineral geology, *physical impressions* are dominant; and its *logic,* is only an artificial instrument which it seeks to employ for arranging those impressions. *How many eminent mathematicians had seen apples fall to the ground, before the intuitive* LOGIC *of Newton's mind apprehended the phenomenon!* How different that *logic* was from the logic of the mineral geology, we have seen by the difference of their respective conclusions.

CHAPTER V.

IT will now be easy to point out, after the preceding distinction, the *cause* of the signal contradiction thus subsisting between Newton and the Mineral Geology. It is simply this; that, in attempting to reason of *the* MODE *of first formations* by Newton's method of *analysis* and *induction*, the mineral geology has not carried the process of *analysis* far enough back; whereas, Newton carried it as far back as it could extend. Let us hear Newton himself.

"By this way of *analysis*," said he, "we may "proceed from compounds to ingredients, and "from motions to the forces producing them; "and, in general, from effects to their causes, "and from particular causes to more general "ones, *till the argument end in the* MOST GENERAL. This is the method of *analysis*. And "the *synthesis* consists in assuming the causes, "discovered and established, as *principles;* and "by them explaining the phenomena proceeding from them, and proving the explanations[1]."

To set this doctrine in all its light, I shall subjoin the commentary of his exact reporter upon this passage.

"In order to proceed with perfect security,

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[1] *Optics*, lib. iii. *in fin.*

" and to put an end for ever to disputes, he pro-
" posed, that, in our inquiries into nature, the
" methods of *analysis* and *synthesis* should be
" both employed in a proper order; that we
" should begin with the *phenomena* or *effects*, and
" from them investigate the powers or causes that
" operate in nature; that, from *particular* causes
" we should proceed to the *more general ones*, till
" the argument end in the *most general:* this
" is the method of *analysis*. Being once pos-
" sessed of these causes, that we should then
" *descend*, in a contrary order; and from them, as
" established principles, explain all phenomena
" that are their consequences, and prove our
" explanations: and this is *synthesis*. It is
" evident, that as in mathematics, so in natural
" philosophy, the investigation of difficult things
" by the method of *analysis*, ought ever to pre-
" cede the method of *composition*, or the *synthesis*.
" For, *in any other way we can never be sure that we*
" *assume the principles which really obtain in na-*
" *ture; and that our system, after we have com-*
" *posed it with great labour, is not mere dream and*
" *illusion*[1]."

Now, the *analysis* of the mineral geology does not extend beyond *mineral matter;* whereas, that of Newton went back to *all matter*, of which *mineral* matter is only *a part*. It must be evident, that it is in the highest degree *unphilosophical* to institute an argument on *the* MODE *of the first formation of mineral matter*, otherwise than by investigating *the* MODE *of the first formation of all matter in the general*, and then, descending to that of *mineral matter in the particular:* because, by so doing, we necessarily leave behind us the *general principle* of the mode of the first formation of *all matter;* and, by assuming a *partial* principle for a *general* one, and continually employing it as a *general* one, we must proceed in error through all our inductions, and the result must be, an error in our ultimate *conclusion*. This has been the case with the mineral geology; for, the principle of *truth* lay precisely in *that part* of the subject, in which the analysis of Newton reached beyond that of the other; which principle being, therefore, not comprehended in the other, it proceeded without its light and guidance; and *thence*, the opposition of principles and conclusions between the two.

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[1] MACLAURIN, *Account of Sir I. Newton's Phil.* p. 9.

The more general is the analysis, the more general also will be the induction; and "the "argument by induction (says Newton) may be "looked upon as so much the *stronger*, by how "much the induction is *more general*." The converse of this maxim must be equally true: that the argument by induction may be looked upon as so much the *weaker*, by how much the induction is *less general*. But, the induction of the mineral geology is *less general* than that of Newton; and, therefore, it is *weaker* in the same degree. In the method of analysis and induction, the extent of the induction must depend upon the extent of the analysis: we cannot conclude securely, further than we have analysed; we can descend no further by synthesis, than we have ascended by analysis; if the latter has been limited to chemical and mechanical causes, we shall conclude to the same; and, if these comprise not the *most general cause,* the most general cause will not be included in the induction. But, *the* MODE *of first formation,* necessarily supposes *the most general cause.*

By confining the analysis to *mineral matter* detached from *universal matter,* and by working entirely within that circumscribed sphere, the view of the mineral geology was narrowed to the peculiar characters which distinguish it as *a class of matter,* namely, *appearances* or *similitudes of chemical action;* and attempting, by principles collected within that partial sphere of contemplation, " to explain its phenomena" and to conclude of *the mode* of its first formation, and forgetting that it was only a *part* of a *whole,* the mode of whose first formation was necessarily the mode of the first formation of *all its parts;* it ascribed the mineral structure of this globe altogether to *chemical action,* as promptly, and with as little hesitation, as it would ascribe to chemical action, a measure of Glauber's salts or sugar-candy, in the shop of a chemist or a confectioner: thus, falling into the class of, what Bacon entitles, " *impedi-" ments of knowledge in slipping off particular*

" *sciences from the root and stock of universal knowledge*[1]." " I see, sometimes (says he), the " profoundest sort of wits, in handling some particular argument, will now and then draw *a* " *bucket* of water out of *this well* for their present " use; *but, the* SPRING-HEAD *thereof seemeth to me* " *not to have been visited*[2]."

Whereas, Newton's contemplation extended and expanded itself to embrace *all matter*, indiscriminately and collectively. Without suffering his view to be arrested, or distracted, by its *particular discriminations;* he applied himself to the consideration of matter in its *totality*, in order to find the *ultimate law* which is common to the *universal system*. In this survey, his mind searched for *the* MODE *of its first formation*, and for an *adequate cause of its existence;* and, sensible that the cause could not exist in the effect, and recognising the skill and wisdom by which the whole was formed and ordered, he concluded; that the *first formation of all matter*, and, therefore, the first formation of all the several *parts or subordinate systems of matter*, was the work of an Intelligent Agent; " *set in order in the beginning, with* " *respect to size, figure, proportions, and properties,* " *by the counsels of His own Intelligence*." He saw all the separate systems of matter converge and unite in *one common centre of wisdom and power*, from which *no one* could bear to be separated more than *another*, and from which alone emanated *the reason* for the perfect existence of *each;* and he ascribed to that common centre of causation, in one and the same proposition, both the *existence* and *perfection* of the vast planetary system of matter — of which *our mineral earth* is a member — and the *existence* and *perfection* of every minutest system of matter attached to this member of the planetary system. "Such "a wonderful uniformity in the *planetary system* "(said he), must be the effect of *choice;* and *so* "*must* the uniformity in the bodies of *animals;* "these, and their instincts, can be the effect "of nothing else than the *wisdom and skill of a* "*powerful ever-living agent*[1]." Thus, Newton accounted at once, and by the same principle, for *all first formations whatever*, whilst the mineral geology can only propose a principle for the first formations of *mineral matter;* a principle, utterly inapplicable to any other system of terrestrial matter, and therefore *proving the extent of its analysis*. And thus, his philosophy easily accomplished, what the mineral geology claims as its province, but which it has never yet even attempted to accomplish; viz. "*to connect with their* "*causes, the phenomena presented in our globe by* "*the* THREE *kingdoms of terrestrial matter*[2]."

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[1] *Interp. of Nature*, vol. i. p. 380.

[2] Ibid. p. 53.

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[1] *Optics*, lib. iii.

[2] " La *Géologie* est principalement distincte de l'Histoire Naturelle, " en ce que celle-ci se borne à la description et classification des

But, Newton prevented the equivocation (shall I say? or the prevarication) which attends the geognostic phrase, "*mode of primitive* or *first form-*" "*ation;*" by employing the simple, distinct, and unequivocal word, *creation*. In doing which, his exalted reason conformed to the plain dictates of *common sense*. For, common sense, duly instructed and rightly exercised, plainly perceives, that *all first formations* must be *creations;* otherwise, there would be formations before first formations. For, *creations* are unquestionably *formations;* and, if they are not *first formations*, they must be *prior to first formations;* which would be a contradiction in terms. The *existence, arrangement, sizes, figures,* and *properties* of all these, Newton ascribed to the *immediate act of God Himself;* and he adjudged it to be "*unphilosophical,*" to ascribe them to any *mediate* or *secondary* cause, such as "*laws of nature*" "*operating in a Chaos.*" De Luc abstained, with a very curious reservation, from employing the word *creation*, in *physical* inquiries: "I shall not say *created*, (said he) "because in *physics* I ought not" "to employ *expressions which are not understood*" "*between men*[1]." Not *understood!* By whom?

" *phénomènes que présente notre globe dans les* TROIS *règnes ;* au lieu que " *la première doit lier ces phénomènes avec leur causes.*"—DE LUC, *Lett. Géol.* p. 3. We should rather have expected, that such a writer would have said, " *avec leur Cause.*"

[1] " Je ne dirai pas qu'elles ont été *créées* ainsi, parcequ'en *physique* je " ne dois pas employer *des expressions sur lesquelles on ne s'entend pas.*" —(*Lett. sur l'Hist. de la Terre,* tom. ii. p. 211.) An anonymous correspondent of the *Journal of Science, &c.* (No. xxx. p. 348.), has been

By those who do not choose to understand it; by those, who, like Falstaff, are "*troubled with the* "*disease of not listening, the malady of not marking.*" Such were, his contemporary atheists and materialists of the middle of the last century. But, was he therefore to compliment those perverters equally of *morals* and of *physics*, by excluding from *physical science* all mention of *creation?* Was he aware, that in excluding the *word*, he at the same time excluded the *idea* associated with the word; and, together with the idea, the *principle* involved in the idea? the exclusion of which, is the very

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excited, by his affectionate attachment to the memory of this great departed naturalist, to endeavour to counteract the citation of this passage; by alleging, that the words — "*sur lesquelles on ne s'entend pas*," should rather have been translated— "on the *sense* of which *people are not agreed.*" I am willing to accept this vindicator's translation, by which De Luc is made to say; "I will not say *created*, because, in *physics*, I ought not to "employ *expressions on the sense of which people are not agreed.*" I do not perceive, what is gained by this change. For, what is the *expression*, on the *sense* of which people are *not agreed?* It is, the simple expression —"*created;*" and it is through consideration for some *disagreeing party*, that he is *not to employ*, and therefore, that he *is to exclude*, that *expression* from his physical inquiries into the *first formation* of mineral substances. The vindicator asks: "Can De Luc be suspected of having *wished* to "exclude the *idea* of creation?" This question is superfluously asked; because, the point under immediate consideration is not an *idea*, but, an *expression;* and because, he well knows, that De Luc could not be suspected of having entertained such a wish. But, on the other hand, no one can deny, that, in point of fact, he here consents to *exclude the expression;* and consequently, he must exclude the *idea* associated with the expression, in treating of *physical* causes and effects with his infidel contemporaries; and it is this *reprehensible concession* to the pseudo-philosophy of his day, (which Newton sublimely scorned to concede to that of his own age,) on which I here animadvert.

parent-cause of all materialism and of all atheism? Newton was well aware of this; and, therefore, although assuredly he knew the laws of *physical inquiry* at the least as well as the best *mineral geognost*, he did *not exclude* the word, but *entertained* it; and proclaimed it, as sufficiently *intelligible* to every *unsophisticated understanding*, and as the *sine quâ non* of *truth* in treating of *material first formations*. His logic found, that *God* is the first *physical* principle in *physics*, as he is the first *moral* principle in *morals;* and, that there is no arguing *truly* in *either* branch of philosophy, without the application of that *first*, *common*, and *universal principle*.—"*De* DEO *ex phænomenis disserere ad* "*philosophiam Naturalem pertinet*[1].—*It pertains to* "*Natural philosophy*," said he, "*to reason from* "*phenomena to* GOD."

Had the mineral geology, therefore, carried its analysis as far back as Newton, it would have concluded to that *first physical principle* for *all first physical formations;* and, if it had done so, its general induction would have been the same as Newton's: but, by stopping its analysis short of the term to which Newton extended his, its induction became "the *less general,* and therefore the "*less strong* by how much it was the *less general*;" and thus, it necessarily fell into *contradiction to him,* as we have seen.

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[1] *Schol. General. Princip. Math.* lib. iii. "Newton," observed Mr. Professor Buckland, in his *Inaugural Lecture* printed in 1820, "was per-"haps the first who carried his eye over this extensive and almost "unbounded prospect.—As any investigation of Natural Philosophy "which shall *not terminate in the Great First Cause* will be justly "deemed unsatisfactory, I feel no *apology* to be necessary for opening "these Lectures with an illustration of the *religious application of Geolo-"gical Science.* '*Hæc*,' says the immortal Newton, '*Hæc de* DEO; *de quo* '*utique ex phænomenis disserere ad Philosophiam Naturalem pertinet.*'"—*Vindic. Geol.* p. 11. It seems to be a blessing almost peculiar to this country, which gave birth to a Bacon and a Newton, that *no apology to science is deemed necessary for a religious application of Geology.*

CHAPTER VI.

BUT, there must have been *some cause*, which determined the mineral geology thus to check its *analytical progress* at the term of *mineral matter;* and to return at once, from that point, to the exercise of its *synthetical operation.*

That cause, was the fascination of *physical impressions*, or, what it denominates *phenomena.* For, being habitually conversant with mineral substances, and powerfully attracted by the admirable characters and varieties which they revealed; the *appearances* of these acquired so dominant an authority in its imagination, as to confine it within their sphere, and to render every other object in nature secondary in its estimation, and comparatively unregarded. And, being unequally instructed in other branches of knowledge, and therefore partial to that particular branch with which it felt itself most familiar; it was led to regard that *one branch*, which in fact extends itself over the entire mineral surface of our planet, as *alone sufficient* to supply all the principles requisite for resolving the problem which it proposed to itself. *Mineral phenomena,* were therefore assumed by the *mineral geology* to be all-sufficient for determining the great question, of *the* MODE *of the primitive formation of mineral substances;* and, in this common principle, *of the all-sufficiency of phenomena,* both the *neptunian* and the *plutonian* or *vulcanian* systems, entirely unite and coincide.

Yet, there were other orders or classes of matter pertaining to this earth, whose *first formations* presented subjects for inquiry of equal importance; and, which could not be separated from the former, in the question of *the* MODE *of first formation,* without a dereliction of the first principles of the philosophy of *Bacon* and *Newton,* and, indeed, the first principles of *common sense:* these were, the classes of *animal* and *vegetable* matter. Newton's *rules of philosophising* require, that we should refer to the same common cause, all existences which share the same common properties; and, the *three kingdoms of matter,* share equally the same common properties of matter. But, besides sharing the same common properties of matter, they demonstrate a *community of system;* each existing with relation to the others, and having the *reason* of its own existence in *that relation.* Thus, the *body of the earth,* exists with relation to the *vegetation* which it is to fructify, and to the *animals* which it is to support: the *two latter,* exist with relation to *the earth,* without which they could neither be *nourished* nor *supported.* "That identity "of design (says Mr. Pr. Buckland,) which has "regulated the organisation of *animals* and *vegetables,* and established in each link of the "boundless chain of living beings a system of de-"licately proportioned laws of co-existence per-

" vading its minutest parts, is equally discernible " in the *subserviency of the earth's structure* to the " necessities and comforts of the various millions " of inhabitants which the Creator has placed " upon it. It is the *same hand-writing* that we " read, the *same system of contrivance* that we " trace, the same *unity of object and relation to final* " *causes* which we see maintained throughout, and " constantly proclaiming the *Unity* of the great " divine Original[1]." This argument, applies with equal force to the earth at its *first formation*, as in its *present condition;* it would be a preposterous abuse of reason, not to infer *original subserviency to ends* from *actual subserviency to ends*. All these, therefore, are in fact, *three* corresponding and constituent *parts or members of* ONE WHOLE; the *first formations* of each of which, must of necessity, that is, in philosophical consistency, be referred to the *same operating cause*, and to the *same mode of operation*. If *any one* of the three was originally formed *perfect for its end*, so also were they *all*. Not to recognise this principle, would bé, to be something more than purblind in philosophy; and indeed we have seen, that the mineral geology lays claim to the province of " *connecting with their causes the phenomena pre-* " *sented by our globe in the three kingdoms*," although it has hitherto confined its exercise to *one only*. What it has thus omitted to perform, we shall now endeavour to supply.

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[1] *Vindic. Geol.* p. 13, 14.

But it is become necessary, first, to expose the consequence of the *dissociation* of those three subjects practised by the mineral geology; and which has extended its effect, to a certain degree, even into the pious philosophy of the *Vindiciæ Geologicæ*. "The consideration of the "evidences afforded by *geological phenomena*, (says "the eminent author of that discourse,) may "enable us to lay more securely the very foun-"dations of Natural Theology, inasmuch as they "clearly point out to us a period antecedent to "the *habitable state* of our globe, and conse-"quently, antecedent to the existence of its inha-"bitants. When our minds become thus fami-"liarised with the idea of a first beginning and "first creation of the *beings we see around us*, the "proofs of design which the structure of those "beings affords, carry with them a more forcible "conviction of an intelligent Creator; and the "hypothesis of an eternal succession of causes, is "thus at once removed. We argue thus—it is "demonstrable from *Geology*, that there was a "period when no organic beings had existence: "these organic beings must therefore have had a "beginning subsequently to this period: and "where is that beginning to be found, but in the "will and *fiat* of an Intelligent and all-wise "Creator[1]?" Sound as this conclusion is, yet surely it is of equal, nay, of *prior* importance for securing the *foundations* of Natural Theology, and for excluding the "hypothesis of an eternal "succession of causes," to acquire as familiar an idea of the "first beginning and first creation" of the *globe itself*, as of the *beings* to whose uses and comforts it was to be subservient; to ascertain, that an all-wise Creator "*made the earth and the* "*sea,*" as well as "*all things that are therein*[1]." Yet, the argument here enforced against an "eternal succession of causes," is expressly confined to the *animal* and *vegetable* kingdoms; and it leaves wholly unconsidered the other hypothesis adverted to by the same writer, of "an infinite "series of revolutions of the earth itself[2]." It is this singular contentedness to stop at the *beginning of the animal and vegetable creations*, and to take no adequate anterior concern respecting the *beginning of the mineral creation*, that has accustomed the mineral geology to *dissociate* the latter question from the former: a dissociation, which is in the highest degree unphilosophical, and which must produce a defective and inconclusive argument, because it is entirely governed by a partial principle. Nor can "the foundations of Natural "Theology, or of True Geology, be securely "laid," until we equally apprehend, and *consociate* with equal familiarity in our intelligence, the idea of the first beginning and first creation of each member of this co-ordinate system—*the* EARTH, *its animals, and its vegetation.* It is, and I assert it in defiance of refutation, a *pure illusion* of the mineral geology, that it is able to point out, by mineral phenomena, a *period* antecedent to the *habitable state* of our globe. *No phenomena,* as we shall presently discover, point out such a *period,* or such a *state of things;* nor would these have ever entered into our minds, had we not been early imbued with the fabulous descriptions of the *heathen Chaos.* When we view this great question in its *entireness,* we shall discern evidence as conclusive to the *intelligence* of the first beginning and first creation of an *habitable globe,* as of *beings fitted to inhabit it;* and it will be as offensive to the perceptions of the intellect, to propound the earth at its first formation as *unhabitable* through *softness,* as to propound the state of animals at their first formation as *immoveable* through *weakness: locomotion* not being more necessary to the *final purpose* of the one, than *habitability* to the final purpose of the other. And, for the very reason that we trace "identity of design, subserviency to ends, "unity of object and *relation to final causes,*" in the adaptation of "the wreck and ruin of our "disturbed earth to the necessities and comforts "of its *present inhabitants;*" the intelligence is perfectly assured, that the earth, at its first creation, received a similar adaptation to the necessities and comforts of its *first inhabitants.*

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[1] *Vindic. Geol.* p. 21.

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[1] Acts, xiv. 15; xvii. 24.

[2] *Vindic. Geol.* p. 21.

But, neither can the mineral geology truly detect any period, that is, any *compass of time,* antecedent even to the *inhabited state* of our globe; nor does any indication exist, to shew any other priority of the earth in time, than that which the reason discerns—that it must have been the first formed, in order to receive and support the inhabitants for which it was *provided;* but, whether in an antecedent age, an antecedent day, or an antecedent moment, no *geological phenomena* can alone enable us to determine. We have therefore no cause whatever to slur over the question of the *first formation of this globe,* as if it were a point specially removed from the attainment of our intellectual apprehension, or to drive it from our contemplation into the crowd of inapprehensible perceptions; it stands upon the same forward line with those of animal and vegetable first formations, and, all the three questions will be found to resolve themselves, ultimately, into one and the same great and *universal principle.*

By the *universal analysis* of matter, we arrive at the *common cause* of all the *three* orders of terrestrial matter and of their several systems, and we perceive the *equal relation of each to that cause;* so that, by discerning the relation of *any one* of them, we at the same time discern that of the *other two.* Now, their respective *characters* or *phenomena* in *first formations,* must be subject to the same common law; and the authority of the *phenomena* for determining *the mode* of their first formations, must be exactly *the same* in each. The highest principle of *probability* in this question to which the mind of Newton could attain by induction, was, as we have seen, " that *all* material

" things were, in the beginning, *created* and *set in* " *order* by God, with such *sizes*, *figures*, *propor*" *tions*, and *properties*, as most conduced to the " *end for which He formed them*;" from the vast planetary system *including this mineral globe*, to the most diminutive insect which exercises its instinctive sagacity upon it. Common sense discerns, that *creation* alone could give *origin of existence*, or *first formation*, to that which before did not exist; it discerns, that there can be no *intermediate* stage or degree between *non-existence* and *existence*, and therefore, no *graduality* in passing from the one state to the other. To the *mode of creation*, we cannot therefore ascribe that *mode of succession* to which we give the name of *time*. The action of *creation*, was therefore effected *without the mediation of time*, and consequently, in that *mode* which we express when we exclude all notion of the mediation of time; namely, *immediately*, that is, *instantaneously* or *suddenly*. Let us, then, endeavour to ascertain exactly, *the authority of* SENSIBLE PHENOMENA *for indicating and determining the* MODE *of first formation in* EACH *of the three kingdoms of matter*, by trying that *authority* in *each of them*, successively.

As we trace back *all terrestrial matter* to a term of *first* or *creative formation*, so we trace back *each of its three orders, or kingdoms*, to the same term; for, *all terrestrial matter*, signifies only *the aggregate of those three kingdoms*. In the same manner, we trace back *all the individuals* composing each order; for, the *order* is only the *aggregate of the individuals* which compose it. We thus likewise trace back the generations of *men*, to a primitive, ungenerated *parent* or *parents;* and we perceive, and are sure, that there must have been a *first formed, created man*, as certainly as there has been a *succession of generated men.* Now, whatever be the standard of age in correspondence to which we may suppose that first man to have been *created*, it must correspond to some period of the human life *subsequent to the birth.* It is of little consequence to the argument, what that age may be; but, it is most consistent with the notion of an Intelligent Agent, and therefore most *philosophical*, to suppose, that He created that *first man* with the perfection of mind and body "*which most* "*conduced to the end for which He formed him.*" That *man* received *a frame*, to be sustained by the laws of *nutrition* which commenced with his existence; which *frame*, was similar to those that were to be engendered from his own. He possessed, therefore, a *bodily structure similar to ours*, and consisting of *similar parts.* Of these, let us contemplate those *solid* parts which support the soft and flexible, namely the *bones;* and let us first ask, "*what is bone*, in its nature and composition?"

To this question, *Anatomy* replies: "the use "of the *bones* is to give shape and *firmness* to the "body; to be levers for the muscles to act "upon, &c.:—their fibres, when *first formed*, are "*very soft*, until, by the addition of a matter

" which is separated by the blood into them, " they grow *by degrees* to the hardness of a cartilage, and *then*, perfect bone. But, this change " is neither made in *a very short time*, nor begun " in all parts of the bone *at once*. By the continual addition of the ossifying matter, the bones " increase till the hardness resists a further extension; and that hardness increasing while they " are growing, the increase of their growth becomes slower and slower, till they cease to " grow at all[1]."

This is, indeed, the nature and composition of *bone*, according to the law established *after creation* by the Creating Agent, for the formation and gradual growth of the *animal system;* and which we call, one of the *laws of animal matter*. But, we are now concerned exclusively with the *first, created, ungenerated man*, and with *his bone;* at the period of whose *first formation* those laws were to *begin to operate*. It is evident, that in this man *none of those processes took place;* but, he was *created*, by the will and immediate power of God, in the same form, and with the same structure, which, *after him*, was to be produced only by the operation of those laws. *His bone*, therefore, was *not* formed " *by degrees*," but " *in a very short* " *time*," namely, " *at once;*" not by " *a continual* " *addition of ossifying matter*," but with the full measure of that matter; not " *with soft fibres, and*

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[1] CHESELDEN'S *Osteographia*, Introd.

" *growing by degrees to the hardness of a cartilage,* " *and then of bone,*" for, this process must commence in a *maternal womb*, from whence he did not proceed. In him, therefore, the *act of the Creator* produced *at once*, by the *incomprehensible mode of Creation*, that form, structure, and composition of *bone*, which in all other men is produced by the gradual process of *ossification*, which has been described.

From hence we obtain this *first principle*, with respect to the *first formations of animal matter;* " that in those first formations the Creating " Agent *anticipated*, by an *immediate act*, effects " which were thenceforward to be produced only " by a *gradual process*, of which He *then* esta- " blished the laws."

If a *bone* of that *first, created man* now remained, and were mingled with other bones pertaining to a *generated race*, and if it were to be submitted to the inspection and examination of an *anatomist*, what opinion and judgment would its *sensible phenomena* suggest to him, respecting *the mode* of its *first formation;* and what would be his *conclusion?* If he were unapprised of its true origin, his mind would *see nothing* in its *sensible phenomena* but the laws of *ossification;* just as the mineral geology " *sees nothing* in the *details* of the " first formations of minerals, but the laws of *pre-* " *cipitation, crystallisation,* and *dissolution*[1]." He would therefore naturally pronounce of this bone, as of all the other bones; that its "*fibres were* "*originally soft*," until, in the shelter of the maternal womb, it acquired "*the hardness of a carti-* "*lage, and then of bone*;" that this effect "*was not* "*produced at once, or in a very short time*," but "*by degrees*;" that after birth, it increased in hardness "*by the continual addition of ossifying* "*matter, until it ceased to grow at all.*"

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[1] See above, p. 29.

Physically true as this reasoning would appear to be, it would nevertheless be *morally and really* false. *Why* would it be *false?* Because it concluded from *mere sensible phenomena*, to the *certainty of a fact* which could not be established by the evidence of *sensible phenomena alone;* namely, *the mode* of the *first formation of the substance of created bone.*

From hence we obtain a *second principle*, with respect to such first formations *by creation:* "That "their *sensible phenomena alone* cannot determine "*the mode* of their formation, since the *real mode* "was in *direct contradiction to the apparent indica-* "*tions of the phenomena.*" What has been here said of the *solid* parts of the animal structure, is equally applicable to *all its parts;* and to *every member* of the *animal* kingdom, at its *first creation.*

Let us proceed from animal to *vegetable matter;* and let us consider the *first created tree*, under which the created man first reposed, and from which he gathered his first fruit. That tree must have had a *stem* or *trunk*, through which the juices were conveyed from the root to the fruit, and by which it was able to sustain the branches upon which the fruit grew. Let us consider the structure of the *wood,* which composed that stem or trunk; and let us ask, *what is wood,* in its nature and composition?

To this question, *Natural History* replies: "If "we entirely remove the bark, we perceive the "*wood;* which is a *solid body,* giving *support and* "*strength* to the tree. On which account, some "naturalists have regarded it as being with "respect to *trees,* what *bones* are in the bodies of "*animals.* The ligneous, or woody folds, are *at* "*first soft and herbaceous,* before they acquire the "*solidity of wood.* They do *not suddenly* pass "from the state of softness which they first have, "to the hardness of perfect wood; they only "acquire the hardness of which they are capable, "*after many years.* In a young tree, all those "woody folds (I mean those sensibly apparent "folds which *indicate the growth of each year,*) are "of unequal firmness, hardness, and density; "those of the centre being the hardest, and "those of the circumference the most tender. "*The hardness of these folds is, therefore, only* "*effected by degrees*[1]*:*—and, since *Nature* does "nothing but by *a progressive course,* it is not surprising that *wood* acquires its hardness only "*by little and little*[2]."

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[1] DUHAMEL, *La Physique des Arbres,* tom. i. c. 3. p. 30. [2] Ibid. p. 45.

This is, indeed, the nature and composition of *wood*, according to the law established *after creation* by the Creating Agent, for the formation and gradual growth of the *vegetable structure;* and which we call, one of the *laws of vegetable matter.* But, we are now concerned exclusively with the *first, created, unpropagated* tree, and with *its wood;* at the period of whose *first formation* those laws were to *begin to operate.* In the wood of this tree, it is evident that *none of those gradual processes took place;* but it was *created,* by the will and immediate power of God, in the same form, and with the same structure, which, *after it,* was to be produced only by the operation of those laws. *Its wood,* therefore, was not formed "*by degrees,*" but "*suddenly;*" its solidity was not acquired "*by a progressive course—by little and little—after* "*many years;*" not by a gradual hardening from a state of softness and herbaceousness; for, that has its origin in a growth from *seed,* from whence this tree did not proceed. In *this wood,* therefore, the *act of the Creator* produced *at once,* by the *mode of creation,* that form, structure, and composition, which in all succeeding trees is produced by the gradual process of *lignification,* which has been described.

Here, then, we find the *same first principle* in the first formations of created *vegetable* matter, that we found in the first formations of created *animal* matter; a principle, *common to both;* viz. "That in those first formations the Creating

" Agent *anticipated,* by an *immediate act,* effects " which were thenceforth to be produced only " by *a gradual process,* of which He *then* esta- " blished the laws."

If a portion of that *created tree* now remained, and if a section of its *wood* were to be mingled with other sections of *propagated trees,* and submitted to the inspection and examination of a *naturalist;* what opinion and judgment would its *sensible phenomena* suggest to him, respecting *the mode* of its *first formation;* and what would be his conclusion? If he were unapprised of its true origin, his mind would *see nothing* in its *sensible phenomena* but the laws of *lignification;* just as the mineral geologist *" sees nothing* in the *details* of " the first formations of minerals, but *precipita- " tions, crystallisations,* and *dissolutions."* He would, therefore, naturally pronounce of *this,* as of all the other sections of wood; that its *" fibres,"* when they first issued from the seed, *" were soft " and herbaceous;"* that they *" did not suddenly " pass to the hardness of perfect wood,"* but, *" after " many years;"* that the hardness of their folds, *" which indicate the growth of each year,"* was therefore effected only *" by degrees;"* and that, *" since Nature does nothing but by a progressive " course, it is not surprising that its substance " acquired its hardness only by little and little."*

Physically true as the naturalist's reasoning would here appear to be, yet, like that of the anatomist, it would be *morally and really false.*

And *why* would it be *false?* For the same reason; because he concluded from *mere sensible phenomena,* to the *certainty of a fact* which could not be established by the evidence of *sensible phenomena alone*; namely, *the mode* of the *first formation of the substance of created wood.*

We thus find a *second principle, common to the first formations both of animal and vegetable matter;* viz. "That their *sensible phenomena alone,* cannot "determine *the mode* of their formations; inasmuch as the *real mode* was in *direct contradiction* "*to the apparent indications of the phenomena.*" What has here been said of the *solid* parts of the vegetable structure, is applicable equally to *all its parts;* and to *every member* of the *vegetable* kingdom, at its *first creation.*

If, therefore, the natures of *created bone* and *created wood* had suffered them to subsist, and to be preserved until the present day; we plainly perceive, how easy it would have been to *demonstrate to the science of physics,* its absolute incompetence to determine any thing at all, by *phenomena alone,* concerning the MODE *of the first formation* of the first individuals composing the *two* kingdoms of terrestrial matter, *animal* and *vegetable.*

CHAPTER VII.

THERE only now remains to be considered, the *third* or *mineral kingdom* of this terrestrial system; and it appears probable to reason and philosophy, by *prima facie* evidence, that the principle determining the mode of first formation in *two parts* of this *threefold* division of matter, must have equal authority in this *third part*. And indeed, after the closest investigation of the subject, we can discover no ground whatever for supposing, that this *third part* is exempted from the authority of that *common principle;* or, that *physics* are a whit more competent to dogmatise concerning the *mode of first formations*, from the evidence of *phenomena alone*, in the *mineral* kingdom, than they have been found to be in the *animal* or *vegetable;* or, to affirm, from the *indications of the former*, that the mode of its *first formation* was *more gradual and more tardy* than that of the *other two.*

Let us therefore try this point, by proceeding with our comparison to those *primitive mineral masses*, whose natures *have suffered them to subsist, and to be preserved until the present day;* let us consider *first, created rock*, as we have considered *first, created bone and wood;* and let us ask, *what is rock*, in its nature and composition?

To this question, *Mineralogy* replies: " By

" the word *rock*, we mean every *mineral mass* of " such bulk as to be regarded an *essential part* of " the structure of the globe[1]. We understand " by the word *mineral*, a natural body, inorganic, " solid, *homogeneous*, that is, composed of integrant molecules of the same substance[2]:— " We may, perhaps, pronounce that a mass is " *essential*, when its displacement would *occasion* " *the downfal of other masses which are placed upon* " *it*[3].—Such are, those lofty and ancient mountains, *the first and most solid bones, as it were, of* " *this globe—les premiers, les plus solides ossemens;* " which have merited the name of *primitive*, " because, scorning all support and all foreign " mixture, they *repose always upon bases similar* " *to themselves*[4], and comprise within their sub-

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[1] D'AUBUISSON, i. p. 272. [2] Ibid. 271. [3] Ibid. 272.

[4] " The fact (says M. Humboldt) that very ancient granular rocks, " entirely destitute of organic remains, *succeed to* (that is, *lie beneath and* " *support*) compact rocks containing organic remains, has *led some dis-* " *tinguished geognosts to conclude*, that this *alternation of rocks* might " perhaps extend *beyond* (that is, *below*) what we call primitive forma- " tions.—I believe *that no direct observation can as yet be produced in* " *favour of these suppositions*:—in the course of a laborious life, I have had " the pleasure of seeing a greater extent of mountains than any other " geognost." (*Superpos. of Rocks*, p. 27, 28, and 76.) Now, to " *con-* " *clude*," upon the only ground which these " distinguished geognosts " can have possessed, that *because sedimentary* rocks are seen to rest upon *primitive*, the latter " *might perhaps* " rest upon sedimentary, and these again upon primitive, in alternating descending courses; is, in point of ratiocination, much the same as if a native of New Holland, or Prince Lee Boo, seeing for the first time a blue slate roof upon red brick walls, had " *concluded*," that the brick walls " *might perhaps*" stand

" stance no matter but of the *same nature*[1].—
" These are the famous *primitive* or *primordial*
" *mountains*, which traverse our continents in dif-
" ferent directions, which rise above the clouds,
" which separate the basins of rivers, which pre-
" serve in their perpetual snows the reservoirs
" that supply their springs, and which form in
" some measure the *skeleton*, or, as it were, the
" *vast frame-work* of the earth—*le squelette, et*
" *comme la grosse charpente de la terre*[2]."—" The
" greater part of geologists, regard the vast *gra-*
" *nitic mass* as the *base* on which all others repose;
" and, to use the expression of Saussure, as ' the
' *primitive rock* by excellence[3].' "—" From
" what we know of the Swedish, Swiss, and
" Tyrolian Alps, of the Apennines, of the moun-
" tains of Siberia, even of the Andes, we may
" admit as an *axiom*, that the highest mountains
" of the globe which constitute the *continuous*

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on a slate roof, and this again on brick walls, and so on, in alternating descending courses. The cause of this confusion, is the abuse of the term *alternation*, in the first instance. There is *no alternation* where, as in the case proposed, the subjects are *only two*—viz. granular or primitive rocks, supporting compact or sedimentary. *Alternation* implies, at the least, *duplicates of both subjects;* which, it is acknowledged, have *never yet been found to exist*. What M. Humboldt here incautiously calls *alternation*, is only *single superposition;* like that of the slate roof on the brick edifice. We see, then, the true value of the *conclusion* of the " distinguished geognosts" to whom M. Humboldt alludes.

[1] SAUSSURE, *Voyages dans les Alpes, Disc. Prél.* p. 6, 7.

[2] CUVIER, *Disc. Prél.* p. 10.—*Th.* § 7.

[3] D'AUBUISSON, tom. ii. p. 35.

" *chains*, are formed of the rock which we name " *granite* (or *granitic*). So far as observations " made on the surface, or in sinking mines and " wells (though to a very little depth compared " with the mass of our planet,) can instruct us, " this *ancient rock*, and the sand produced by its " decomposition, form the *base* of all our conti- " nents. It is *granite* that we meet with below " the deepest strata of mountains, and often " in low-lands where strata are carried away by " the violence of inundations; it is *this rock* that " forms the great prominences, and as it were the " heart or *core* of the greatest Alps of the known " world. So that nothing is more reasonable, " than to assume this rock for the principal " ingredient of the interior of our globe[1]."— " These primitive masses are *stamped with the* " *character of a formation altogether crystalline*[2]."

Had the *mineral geology* contented itself with this *simple mineralogical statement*, we should have argued thus concerning the *crystalline phenomena* of the first mineral formations, conformably to the *principles which we have recognised*:—As the

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[1] PALLAS, *Observ. sur la Form. des Montagnes*, &c. p. 5. This inference, is not shaken by any of the latest discoveries in tabular mineralogy. M. Humboldt, after his laborious exploration of the Andes, can only assail it by asking; " How can we demonstrate a *negative fact?* " how can we prove, that beneath a *granite* some *other primitive rock* " may not again be found?"—*Superpos. of Rocks*, p. 85. Granting the possibility, it will not affect the present argument; which will then rest equally secure on that " *other primitive rock*."

[2] D'AUBUISSON, ii. p. 5.

bone of the first *man*, and the *wood* of the first *tree*, whose *solidity* was essential for "giving shape, "firmness, and support" to their respective systems, were not, and could not have been, formed by the gradual processes of *ossification*, and *lignification*, of which they nevertheless must have *exhibited the sensible phenomena* or *apparent indications*; so, *reason* directs us to conclude, that *primitive rock*, whose *solidity* was equally essential for giving shape, firmness, and support to the mineral system of this globe, was not, and could not have been, formed by the gradual processes either of *precipitation and crystallisation*, or of *fusion and crystallisation*, notwithstanding any *sensible phenomena* apparently indicative of those processes, which it may exhibit; but, that in the *mineral* kingdom, as in the *animal* and *vegetable* kingdoms, the Creating Agent *anticipated* in His first formations, by an immediate act, *effects* whose sensible phenomena could not determine the *mode* of their formation; because, *the real mode was in direct contradiction to the apparent indications of the phenomena*.

The *correspondence* and *correlation* of the *three subjects*, are pointed out by physical science itself in the passages which have just been quoted; for, *natural history* there points out the analogy of the *wood* in the vegetable structure, and *mineralogy* points out that of *primordial rock* in the mineral structure, with the *bone* in the animal structure. *Solidity* and *consistency*, therefore, are the *common* *properties* of all the *three.* To *produce that solidity and consistency,* which were as necessary for the surface which was *to sustain,* as for the bodies which were to *be sustained* by it, was equally the *end* of the formation of *each;* and, therefore, according to Newton's *second* rule, we are bound by reason to assign the *same identical cause* for the solidity and consistency of *each.* And it will then necessarily follow; that *primitive immediate crystallisation,* can furnish no *data* for computing *time,* more than *primitive immediate ossification,* or *primitive immediate lignification.*

It matters not to this argument, as was before observed, whether the mineral geology adopts the *neptunian* or the *vulcanian* scheme; whether it *sees* in the *phenomena* of minerals, the characters of *aqueous solution* or of *igneous fusion;* whether, with the *new* geogony, it "*leans to the idea* of the lignified masses ascending from below upwards, or, with the *ancient* geogony, to movements in an opposite direction[1];" because, the argument is directed, *universally,* to the question — *of the authority of phenomena, in* FIRST FORMATIONS, *for determining at all, the* MODE *of their production;* and it is, therefore, in no manner affected by the particular differences subsisting between those two conflicting hypotheses: whether the *phenomena seem* to indicate the *mode of water by descent* or the *mode of fire by ascent,* they cannot possibly be indicative of the *real mode.*

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[1] See above, p. 35.

But, the *mineral geology* has not contented itself with that simple *mineralogical statement;* nor drawn the conclusion which we have drawn, in conformity with the principles, and in observance of the rules, of Newton's philosophy. It affirms, "that the *characters* by which geology "is written in the book of nature, in which it is "to be studied, are *minerals*[1];" and it "*sees* "*nothing*" in that book of nature, but "precipi-"tations, crystallisations, and dissolutions;" and therefore, because it *sees nothing else*, it concludes without hesitation from *crystalline phenomena* to *gradual, progressive, chemical crystallisation.* Thus, by attempting the impossibility of deducing an *universal principle*, viz. *the mode of first formations*, from the analysis of *a single individual*, viz. *mineral matter*, separate from coordinate *animal and vegetable matter*, and by concluding from that defective analysis to the *general law of first formations;* it set out with inadequate light, and it is no wonder that it has ended in absolute darkness, for such is its *elemental chaos*, and its *chemical first formation of this globe:* a doctrine, so nearly resembling the exploded *atomic philosophy* of the Epicurean school, that it requires a very close and laborious inspection to discover a single feature by which they may be distinguished from each other.

The *sensible phenomena*, which suggest *aqueous crystallisation* to the Wernerian and *igneous crystal-*

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[1] D'AUBUISSON, *Disc. Prél.* p. 29.

lisation to the Huttonian, in examining a fragment of *primitive rock*, are exactly of the same authority (*but not of a particle more*), with that which would have suggested *ossification* and *lignification* to the anatomist and naturalist, who should unknowingly have inspected or analysed *created bone*, or *created wood;* and, the *same error* would have befallen *all the three*, should each have concluded, from what they *saw*, that the substances which they were severally engaged in examining, had been formed by the several *modes* or *processes* of *crystallisation*, *ossification*, and *lignification*. The mineralogist cannot *see* more, with all the aid of his *goniometers*, in the primary or constituent crystals of primitive *rock*, than the anatomist could have *seen* in the constituent fibres of primitive *bone;* nor can the former any more discover *the mode* of the formation of the *rock* by the laws of *general chemistry*, be they the laws of *fire* or the laws of *water*, than the latter could have discovered the *mode* of the formation of the *bone*, by the laws of *generation* and *accretion*. To *search* for it, is an exercise far better suited to the genius of *alchymy* — " *ars sine* " *arte*," than of *chemistry;* for, in what (I would ask,) does the mineral geologist's research for the *mode* of the composition of the *rock*, differ in principle from that of the alchymist, for the *mode* of the composition of the *gold* innate in the rock?

But, there is this notable difference between the three cases; that, the *animal* and *vegetable* *structures* were formed to continue only for *short durations of time;* they were to reproduce their species and to perish, and to be continued only by the *succession of generation;* the *first formations* of these, have therefore long since been resolved into their ultimate elements, and are now totally irrecoverable by us. Whereas, the first formed *mineral masses* of this globe, constituting its "*skeleton* or *vast frame-work*," were not made to reproduce their kind, nor to perish within the experience of the human race; these therefore *still subsist*, with the natures and structures which they *received* at their *first formation* or *creation*. Such are, the *granitic masses* which we have contemplated; which were coexistent with; because anterior to, *created man*.

Hence it is evident, that we are to reason of *primitive rock*, as we should reason of a *hortus siccus* composed of *created plants* from the garden of Eden; with which plants those primitive masses were contemporary, although they have so long outlasted them. If we *knew* that those dried plants were formed before the laws of vegetable generation and growth could have commenced, we should take no account of the *apparent indications* of generation and growth in their *phenomena;* nor should we suffer ourselves to be deluded by them, with respect to *the mode* of their formation. In the same manner we are to dispose our judgments, with respect to the *first mineral formations;* which were unquestionably formed by the *same mode*, because anterior to the first flowers that grew upon the earth.

I entirely exclude from the *present stage* of the argument, all consideration of mineral formations to which the character of *primitive* cannot appertain; because, it is exclusively engaged with the question of *first formations*. These we can securely allege, in the vast "*frame-work*" of the globe; which reveals its unity and identity in every region of the earth, whatever changes or catastrophes the *original superior surface* may have undergone. Of that *original superior surface,* we know nothing, and can know nothing. The *changes* which have altered it, will form the proper subjects of the *succeeding stages* of our argument; in the *present stage,* the mind must confine its meditation, absolutely, to the primitive formations of the mineral kingdom, and to the perfect analogy which they bear to the primitive formations of the other two kingdoms, in the question of the *mode* of their formation.

When, therefore, we handle a piece of *granite* from the Alps, the Andes, or the Himmaleh mountains, and think that we discern in it the characters of *aqueous* or of *igneous* action; if we would be sure to reason *unphilosophically and falsely,* we shall instantly conclude, from the first promptings of our *senses,* that the *mode* of its first formation was by *aqueous solution* or by *igneous fusion;* we shall say, "this substance *looks as if* "*it was formed* by the agency of *water,* or of *fire;*

" we *see* nothing in it, but the characters of *water*, " or of *fire ; therefore,* it *was formed* by the agency " of *water*, or of *fire*." And, thus it is that the mineral geology *actually does reason,* though professing to govern its reasoning " by the principles " of *sound physics,* and the rules of an *exact logic*[1] :" nothing can be more unphilosophical and *popular,* than such *prima facie* conclusions. It reposes upon its favourite, seductive principle ; that what it terms *facts in geology,* are *self-evident,* and need only to be *seen* to be *believed.* Yet, when those alleged *facts in geology* come to be examined, they prove to be nothing more than *appearances in mineralogy.* The geological *facts* to be deduced from the *appearances,* lie widely distant from them ; and therefore, they cannot possibly *be seen.* It thus confounds the *present phenomena,* which are its *premises,* with the *absent facts,* which are designed to be its conclusions ; so that, when it affirms that the *geological facts are self-evident,* it only insists, in an unskilful and entangled proposition, *that the geological conclusions which it draws, are self-evident in the mineral phenomena to which it appeals :* that is, that since we *see,* or *persuade ourselves that we see* in the *granite,* characters of *water,* or of *fire,* it is *self-evident* that it was formed by the *one,* or by the *other,* of those opposite agents.

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[1] " L'on peut *se faire une idée*" (Bailly)—" on *se représente d'abord*" (Cuvier)—" nous pouvons *nous représenter* " (D'Aubuisson)—is a mode of evidence, which commands an unaccountable authority in the French chools of philosophy.

Which *self-evidence* pertaining *equally* to the *neptunian* and the *vulcanian* schemes, that is, to two contradictory schemes *mutually and essentially destructive of each other;* we need say no more, to render apparent the *true nature of all such self-evidence*[1].

But, if we would reason *philosophically* upon the phenomena, and conformably to the principles and method of Newton, we must take our premises much higher than the mineral geology, and reason thus:—This piece of *granite*, is a portion of that order of terrestrial matter which constituted the *first essential mineral formation* of the globe; it was, therefore, not formed by any *secondary cause*, but was "*created* and *set in its order* by the Creator, "with the *properties which most conduced to the ends* "*for which He formed it;*" which properties, were *perfect solidity* and *stability*. It was designed by Him, to sustain the *loose materials of the globe;* as the *bones* were designed by Him, to sustain the *soft and flexible parts of the animal body.* All His first formations, were made in *correspondence* with the laws which He was then *about to establish,* and in *anticipation of effects and appearances* which were thenceforward to be produced only by the operations of those laws. *Crystalline composition,* was then ordained to be the *mode of mineral solidity;* and the primitive crystalline formations, to be the general *prototypes*[1] of that mode. And, since there are no periodical decays and generative reproductions of *granite mountains,* as there are of *animal and vegetable structures,* and therefore no known laws for their successive or occasional formation; it is reasonable and philosophical to regard this piece of *granite* as a part of a *first mineral formation,* the *mode* of which was *Divine Creation,* and which has therefore *always subsisted the same, since the act of Creation brought it into being.*

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[1] The allegation of *self-evidence*, is often only the evidence of the extent of knowledge or inquiry. When Belzoni was in Egypt, some Arabs brought to him "*a large piece of diamond*" carefully wrapped up, on which they set a very high valuation. *How* did those Arabs ascertain, that their precious property was a *diamond?* By "*self-evidence:*" because "*it needed only to be seen to be believed.*" But, Belzoni's European habits, and more widely extended knowledge, caused him at once to discern; that the proffered *diamond*, was only "*part of the stopple of a* "*common glass cruet.*" (BELZONI'S *Narrative*, p. 106.) The "*self-evi-* "*dence*," on which the mineral geology pronounces—the *crystallisation of granite in a Chaotic menstruum*, the *spheroidal formation of the earth by the antagonist forces of gravity and centrifugity*, and many others of its alleged *geological facts;* bear precisely the same relation to the *true philosophy*, that the *diamond of the Arabs* bore to the *European experience of Belzoni.*

" But (exclaims the mineral geology,) can any " one uphold the doctrine of *universal formation?* " Let him who answers in the affirmative reflect " on *the consequence* which that doctrine involves. " He *must admit,* that when the particles of " *quartz, feldspath,* and *mica,* which had before " *arranged themselves* so as to form granite, " *changed* their mode of arrangement, so as to " form gneiss, that change was conveyed, *with the* " *rapidity of an electric shock, from one end of the*

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[1] HUMBOLDT, *Superpos. of Rocks,* p. 382.

"*world to the other:*—that the *currents* of the different hemispheres had so *equable* a motion; "that the particles borne along by *these currents* "were so *equally assorted*, that *within the tropics* "*and without, the same dispositions began and ceased* "*at the same moment:*—that similar pebbles were "detached from their native rocks at the poles "and at the equator, *by equal forces acting under* "*the same circumstances*, and were deposited *by* "*the same means*, and *at the same time*. All these "he must admit, or reject *in toto* the doctrine of "*universal formation*[1]."

We have no objection whatever to the alternative which is here offered us, only we must rectify some material confusions in the statement. For, in admitting *universal formation*, we are so far from admitting what is here assumed, viz.:—that the particles of *quartz, feldspath*, or *mica*, previously *arranged themselves*, or subsequently *changed the mode of their arrangement;* that we absolutely deny, that any particles of matter, of any description whatever, *arranged themselves at all, prior to universal formation:* because we affirm, that *universal primitive formation, gave to all particles of matter both their being and their primitive arrangement.* "In compound rocks consisting of "parts aggregated to each other, all those parts, "that is to say, the minerals that compose the "rocks, were *formed in the place where they*

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[1] Greenough's *Geol.* p. 225.

" *appear*. Among those aggregated rocks, some " were formed by *immediate aggregation*, and " have, in a manner, *grown at the same time*. " The rocks of this class, are of *granitic structure*[1]."—Though, " the most ancient formations " of primitive rock are, in some regions of the " globe, *granite* alternating with no other rock, " and in other regions, *granite* alternating with " *gneiss*[2]"—and though " *mixed* formations and " periodical alternations of *gneiss* and *granite*, and " of *gneiss* and *mica-slate*, are much more frequent " than the simple formations of *granite*, *gneiss*, " and *mica-slate*[3];" yet, " all these mixed and " alternating formations constitute a *simple formation*, and are *all three contemporary*[4]." From these admissions of the mineral geology, we conclude; that all these formations are the production of the *same simultaneous operation*, which variously compounded the crystals of *quartz*, *feldspath*, and *mica*, and at the same time variously disposed the compound masses. And we cannot be embarrassed by " *the rapidity*" of that operation " *from one end of the world to the other*, " *like an electric shock*;" because, we suppose it in *the* MODE *of first formation*, which was *Divine* CREATION. We cannot be perplexed by the *consequence*, that the particles must have been " *equally assorted, both within the tropics and with-*

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[1] D'AUBUISSON, tom. i. p. 277, 8.

[2] HUMBOLDT, *Superpos. of Rocks*, p. 85.

[3] Ib. p. 95.

[4] Ib. p. 97.

"*out, at the same moment;*" because we conclude with Newton, "*that all the particles of matter* "*were variously associated at the* FIRST CREATION "*by the counsels of an Intelligent Agent.*" And, for the same reason, we find no difficulty in supposing this operation to have taken effect "*at the poles* "*and at the equator, by the same means and at the* "*same time;*" because, it is the very conclusion of Newton's philosophy and of unsophisticated reason; which teach, *Universal Primitive Formation by the Creative Act.* When therefore we are told, that "when we examine the solid mass of "our planet we soon perceive—that those asso- "ciations which are called *compound rocks,* do not "vary, like organised beings, according to the "difference of latitude;"—that "geognosts who "have travelled through the most distant coun- "tries have not only found for the most part, in "the two hemispheres, the *same simple substances,* "quartz, feldspar, mica, garnet, and hornblende, "but they have also observed, that *mountain-* "*masses display every where the same rocks:*"—and that "if it has sometimes been considered that "a rock belongs exclusively to a single portion of "the globe, subsequent researches have shewn "that it occurs also in regions the most distant "from its first locality[1];" we only find, in these statements, augmented and unequivocal evidence of an universal simultaneous operation, effected by Infinite Power to attain an end of Infinite Intelligence.

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[1] HUMBOLDT, *Superpos. of Rocks*, p. 3, 4.

" What, then! (it will perhaps further exclaim,) has God introduced *appearances* into His " works, to *mislead* and to *deceive* His moral and " intellectual creatures? Has He affixed *phenomena*, which should seduce them into *error?*" —Μη γενοιτο, *God forbid!* Great was the authority which warned, μη κρινετε κατ' οψιν, αλλα την δικαιαν κρισιν κρινετε—" *judge not according to appearance* " *(only), but judge a right judgment;*" and although this precept was not addressed to the *mineral geology*, yet it is of *universal force* in every subject which may engage the *reason*. Those *phenomena* cannot mislead, deceive, or seduce any one, who faithfully and diligently exercises his moral and intellectual faculties by the rule which God has supplied for their governance; but, only those who neglect to exercise them by that rule. For, those very faculties, while they direct us to infer *universal first formation by the immediate act of God*, caution us, at the same time, *not to be misled by the phenomena which that act must necessarily have occasioned.* They warn us, that all *first formations* of the *material works* of God, must have received a *specific form* of their substance, and therefore, must have exhibited to the *visual* sense *specific characters*, even at the moment when they were first called from non-existence into being. Whether it were the first formed *bird*, or the first formed *shrub* on which that bird rested, or the first formed *rock* on which that shrub grew, each must have instantly exhibited *sensible phenomena;* the first, of *ossification,* the second, of *lignification,* and the third, of *crystallisation.* Yet, the *phenomena* would not have been truly indicative of *actual* ossification and *actual* lignification in the two first cases; and therefore, they would not have been truly indicative of *actual* crystallisation in the last; that is to say, of those subjects having actually passed through any of these *gradual processes.* There is no possibility of escaping from the demonstrative power of this *great principle,* which extends itself, equally, to *first formations* in all the *three* kingdoms of terrestrial matter; and which, without intending any unbecoming tone of defiance, we may confidently challenge the mineral geology to invalidate[1]. And, the uniformity, regularity, and simplicity of all the works of God, direct us to believe; that the *texture,* and consequent *phenomena of first formations,* in all those *three* kingdoms, would have manifested a direct correspondence with the laws which He was then providing for each, respectively, in His new system. It would have done so in the *first bone*, it would have done so in the *first wood*; therefore, it would have done so in the *first rock*. The *bone*, and the *wood*, have passed away; but, the *rock still remains*, and we contemplate it at the present hour, in the east and in the west, in the north and in the south. If *crystalline composition* is the property, which, by the laws appointed at the creation, constitutes the *greatest hardness and solidity in mineral substances*, we shall expect, that *the primitive mineral masses of the globe will be "stamped "with a character altogether crystalline*[1];" just as we conclude, by parity of reason, that *the bones of the first animals must have been stamped with a character altogether calcareous*. 'Ο ΘΕΟΣ ΓΕΩΜΕΤΡΕΙ, "GOD GEOMETRISES"—was the pious and sublime axiom of the eminently learned predecessor of Newton in the mathematical chair[2]; and, *true philosophy* will recognise this great truth, so manifest throughout creation, in the *primary* or *ele-*

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[1] This is the principle, that appears to the able Edinburgh Reviewer of the *Reliquiæ Diluvianæ* (No. lxxvii. p. 206,) " *to threaten to take us* " *back to the darker ages of geology.*" I can well conceive, that the novel and sudden presentation of this great luminous principle, may cause a sort of momentary *offuscation* of the mental vision habituated to view these questions in the shade of *physical twilight.* It may, for a moment, be " *invisible* to him *through brightness;*" but, his intellect is constituted to recover itself speedily from that first immediate *imperception,* and to meet the lustre of the principle with the steadiness of an eagle's eye.

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[1] See above, p. 82.

[2] See "*Life of* ISAAC BARROW," prefixed to his works; or, "*Lives* "*of the Professors of Gresham College.*" To the above sublime axiom, the following sublime fragment was found annexed in his own handwriting, at the beginning of his Apollonius. "Tu autem, Domine, "quantus es *Geometra!* Quum enim hæc scientia nullos terminos "habeat, cum in sempiternum novorum theorematum inventioni locus "relinquatur, etiam penes humanum ingenium, Tu uno hæc omnia in- "tuitu perspecta habes, absque catena consequentiarum, absque tædio "demonstrationum. Ad cætera pene nihil facere potest intellectus "noster; et tanquam brutorum phantasia videtur non nisi incerta quæ-

mentary crystals whose wonderful aggregation constitutes the solidity of *primitive rock.*

But, although *created bone,* at the moment of its first formation, could not have indicated the *mode* of that formation, yet, as the frame in which it existed was thenceforth subjected to the new laws of nutrition and accretion, of deterioration and decay, *various effects* would have been wrought in the osseous system during the progress of life, by the operation of those laws; so that, after death, the *phenomena* exhibited by the bones would have *combined* those which, being of *creative formation,* could not indicate physical causes, and those which, being of *secondary operation,* might indicate physical causes; but, to *draw the line exactly between these,* would have been absolutely impossible. And so, also, with respect to *mineral formations:* no *phenomena* could indicate the mode of their *first formation,* which was necessarily by *creation.* But, if there exist any laws in the mineral kingdom, ordained to effect alteration in any of its *primitive crystalline substances* by secondary agencies, those laws could only have been in

" dam somniare, unde in iis quot sunt homines tot existunt fere sen-
" tentiæ: in his conspiratur ab omnibus, in his humanum ingenium se
" posse aliquid, imo ingens aliquid et mirificum visum est, ut nihil magis
" mirum, quod enim in cæteris pene ineptum, in hoc efficax, sedulum,
" prosperum, &c. Te igitur vel ex hac re amare gaudio, Te suspicor,
" atque illum diem desiderare suspiriis fortibus, in quo purgata mente
" et claro oculo non hæc solum omnia absque hac successiva et laboriosa
" imaginandi cura, verum multo plura et majora ex Tua bonitate et
" immensissima sanctissimaque benignitate conspicere et scire conce-
" detur, &c."

operation since the moment when the first created formations were completed; and, by the same rule as the former, in contemplating at the present day the universal mineral system of our globe, the intelligence will easily apprehend; that its *present phenomena* may, in a similar manner, *combine* those which, being of *creative formation,* cannot indicate physical causes, and those which, being of *secondary operation,* may indicate physical causes; but to draw the line exactly between these, will be just as impracticable in the *latter* case as in the *former.*

Those persons, therefore, who rightly use the faculty of reason, will be in no danger of being *deceived* by *primitive phenomena;* but will ascribe them, by rational induction, to the *immediate design and act of God.* To others, indeed, they may become a judicial snare: to "*take the wise in their* "*own craftiness, and to make foolish the wisdom of* "*science, falsely so called.*"

De Luc, in his "*Letters on the Earth,*" observed: "Neither natural history nor physical "science lead us to believe, that our globe has "existed *from all eternity;* whenever, therefore, "it acquired its *first existence,* the *matter* of which "it was composed must, in all necessity, have "been of *some nature,* and under *some first in*"*tegrant form*[1]." His mind was, for a moment, sensible of this great truth; and he was then nearer to "*a solid basis for geology*[1]," than he ever was afterwards. But, it was only for a moment; for, from that period his philosophy *retrograded*, whilst he imagined that it was *advancing*. He wanted either the ability, or the resolution, to trace back all the links of the chain which connect the *actual phenomena of mineral matter* with that great *remote principle*. He vacillated; he could not stand the intermediate sarcasms of the celebrated *physical philosophers* who were his contemporaries, and some of them his distinguished fellow-countrymen; and, resorting to his fatal system of *compromise* and *concession*, he sought to conciliate the good fellowship of *physical science*, by surrendering that high and solid principle to the *chemical geology* of Saussure. "In my letters "on the *History of the Earth*," says he, "I ac"knowledge that I *saw nothing as yet* that could "lead me to *conceive the formation of primordial* "*substances*, the masses of which were *unintel*"*ligible to me*. Since the publication of that "work, that of the observations and remarks of "M. de Saussure *has become for me a compass by* "*which to steer*.—From *that time*, the observations "of mineralogists, together with my own, have "placed beyond all doubt this *great geological* "*fact*—that all the *visible* mass of our continents, "except volcanic substances, *formed itself in suc*"*cessive beds or strata of different kinds, beginning*

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[1] Tom. ii. p. 211.

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[1] See above, p. 30.

"*with granite.*—It is impossible to deny this, "after reading the '*Voyages des Alpes*' of M. de "Saussure; in which that great observer has so "accumulated the *proofs of this truth,* that no "one can doubt it, and retain any *right to the* "*title of geologist*[1]:"—that is, of *mineral geologist.* Thus, the importunity of *sensible phenomena* fascinated and overcame his judgment; and drew down his view from the elevated *truth,* of which he had just caught a glimpse. He retrograded from the path of Newton, and plunged into the chaos of *chemical first formations;* and he thereby reduced himself to the necessity of seeking, by a daring and inerudite tampering with texts of Scripture, that visionary and arbitrary chronology for the *effects of Creation,* which he had before strenuously denied to other mineral geologists, who had demanded the same for the *effects of the Deluge.*

I am well aware, of the power of *phenomena* on the mind; and, of the difficulty which the mineral geology experiences, in resisting their importunity with respect to the *mode* of the *first mineral formations.* But then, I am equally aware of the difficulty which every *countryman* experiences in renouncing his persuasion, that *the sun rises from the earth* in the morning, and *sets* at night, either *in the ocean* or *behind the hills.* The *difficulty,* is exactly of the *same kind* in *both* cases, and proceeds from the *same cause,* viz. the *contradiction of*

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[1] *Lettres Géologiques,* p. 73, 74, *note.*

the real fact and apparent indications of the sensible phenomena; but, these *contradictions of fact and phenomena* plainly appear to reveal *a law*, designed to stimulate the exercise of our *rational* and *moral faculties*, and to *abstract them from the dominion of sense.* If that *law* is not resisted, the *intellect* will experience no greater offence or difficulty, in contemplating the crystalline foundations of the globe as the immediate effect of Creative Power; than it experiences, in contemplating each succeeding day as our own revolution from West to East, in contradiction of the powerful *sensible suggestion*, of the Sun's revolution from East to West. As the *countryman* cannot entertain the latter contemplation, just so it is, that the *mineral geology* cannot entertain the former.

CHAPTER VIII.

THE entertainment of a *chaotic philosophy*, however modified, within the lights of *reformed philosophy* and *revelation*, is a *monstrum* in the history of the human mind; because, there exists no reason whatever, *à priori*, for supposing, that an *Intelligent* and *Omnipotent Agent* gave *imperfect existence* to any of His *first formations;* and, because we have found ample proof, *à posteriori*, that in *two parts* of this *tripartite* system of matter, the first formations must have been produced in their full perfection—*perfect bone*, and *perfect wood.* We are therefore directed, by every sound principle of analogical reasoning, to infer; that in the *third part*, where the first formations were as essential to the *structure of the globe*, as in the two former to the *structures of their respective systems*, the first formations were likewise produced in their full perfection—*perfect rock;* and we have seen, that the indications of *sensible phenomena* can have no authority whatever in this question. To conclude, then, to a *chaos* for that *third part* of matter, in the *present state of our knowledge*, is far more monstrous, than the conclusion to an *universal chaos* in the *heathen world.*

It is the common error of that which calls itself *philosophy* in our days, to assume, that the movements of the mind are always and necessarily *progressive towards truth;* whereas, a little reflection on common experience is sufficient to shew us, that they are often *retrogressive from it.* Among the numerous evidences testifying this fact, none establish it more demonstratively, than the *return to a Chaotic principle* by our professors of physical science,

> "Nunc in Aristippi furtim præcepta *relapsi*,"

in order to explain the structure and composition of our globe. The pretended analogies by which that principle is attempted to be maintained, are too obviously fallacious to affect the judgment of any one who is at all at the pains to think for himself, and who does not permit the thread of his thoughts to be intersected.

"In the *present order of nature*, (says the mi-" neral geology,) we observe that *animals and* " *vegetables* advance by a comparatively *slow* pro-" gression to maturity; such *appears* also to have " been the *order of nature* in the progression of " *our planet to a tranquil state*[1]." The false reasoning of this argument needs scarcely to be pointed out: it first takes ground upon a *pre-assumption*, that our planet *actually experienced a progression* from an originally agitated to a tranquil state, (which is the point refused;) and then it attempts to confirm that *pre-assumption*, by comparisons which can yield no analogy whatever; namely, 1. a comparison of the *present order of nature*, with *another supposed antecedent state of things* which it equally calls the *order of nature;* and, 2. a comparison of the *secondary* formations of *generated animal* and *vegetable* structures under the *present* order, with the *first formation* of the *mineral* structure in that supposed *antecedent* state; between which things, it is manifest that there can exist no relation of analogy. The "*present order* "*of nature*," is a phrase without a meaning, if it is not intended to express *the order established by God at the creation;* as Bacon interprets it. But, this excludes any *pre-existing order of nature*, which are words absolutely without any meaning at all; not only in religion and philosophy, but, also in *common sense*, which plainly perceives, that "*nature*" is here a senseless slovenly word, borrowed from heathen ignorance, and only serving for the obstruction and obscuration of truth[1].

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[1] BAKEWELL, *Elements of Geology*, p. 429.

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[1] To demonstrate, once for all, the absurdity of the use to which *physics* have at length brought the term *nature* amongst us, let us trace that term to its origin. "*Natura*," is a noun formed from the future participle of *nascor*—"*naturus*, non *nasciturus*" (CLEDONIUS, Gramm. Lat. Ant. p. 1914); as *genitura* from the future participle of *gigno*—*geniturus*, *messura* from *metor*—*messurus*, (DIOMED. ibid. p. 474) &c. "*Natura*," would therefore signify, actively, "*oritura* vel *proventura*— "things about to *be born*, i. e. *arise*, or *come forth*;" and, its primary and simple signification would have merely expressed the common experimental *effect*, of *things perpetually ready to come forth and succeed each other*. As the minds of those who originally used the term were sunk into heathen darkness, and as the external Cause which "*maketh the* "*grass to grow for the cattle, and herb for the service of man*," was obliterated from them, the intellect, which constitutionally seeks to connect effects

To reason *right*, the analogy should have been stated between the *first formations* in *all the three kingdoms of matter;* between the first *man*, the first *tree*, and the first *rock*, *before* the present order of nature commenced its operations; and, the *time* required for the first formation of the *first two* of these being found, would give the time required for the first formation of the *third.* But, what inference can be drawn concerning it, from "*the comparatively slow progression to maturity*" of generated animals, or of propagated trees, under the *present order of nature?* The supposition of a *primitive confused mixture of elements produced by the Creator*, whether in the form of a *chaotic liquid* or of an *amorphous paste*, is the supposition of an *imperfect creation;* but, the tender condition of nascent animals or vegetables under the *present* laws of generation, is no imperfect creation, but a

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with their causes, sought ignorantly for the cause *in the effect itself;* and, the things which "*natura* vel *proventura essent*," were assumed to contain their cause *within themselves.* Thence, that *fictitious cause* received the general denomination of "*natura;*" and was elevated by a false philosophy into an universal mysterious internal principle, causative *per se* of all the effects produced in all the different orders of beings constituting this visible world. This "*Natura*," unexamined and undetected, is the *Nature* to whose operation *modern physics* so resolutely strive to vindicate the *first formations* of the earth; and, which they consent to receive from the authority whose title I have here exposed. To this *natura* of the Latins, answers the φυσις of the Greeks; which also, in the *later ages*, was erected into *a cause.* But, Homer knew no such *cause* or *principle:* it was *after his days* that both φυσις and *natura* obtained their new dignity; and it is to be observed, as has already heen noted of τυχη, *fortuna*, *chance*, that φυσις, *natura*, is not mentioned by Homer. (See *Exam. of the Prim. Arg. of the* ILIAD, p. 227; and above, p. 47, *note* 2.)

beautiful *part and sequence of that first formation,* in which the first animals and first vegetables were *created perfect.* If the mineral geology could shew it to be *probable,* that the *first man* and the *first tree* subsisted at first an " *imperfect substance,* " *which day by day was fashioned when as yet there* " *was none of them*[1]," then indeed it might infer, with some consistency, " the comparatively *slow* " *progression* of our planet, from a state of *chaos* " to a state of *maturity;*" but, that it never can shew; and therefore, it can never draw the latter inference from the laws *now operating in generated beings,* without renouncing all pretensions to the faculty of grounding or conducting a logical argument. There is *a reason,* for the slow progression of *generation* or *secondary formation;* but, there is *no reason whatever, for supposing slow progression in first creative formations.*

Again, it would argue by analogy; and it asks, " *Why are there mountains on the globe?*" which question it immediately answers, exultingly, with this other question: " *Why are there* " *pyramids in Egypt?*" as if it should say, " *are* " *you answered now?*" and it adds; that " the " *course* which the *antiquary* pursues in his " researches concerning *pyramids,* marks out " that of the *geologist* with respect to *mountains,* " and their bases, our *continents*[2]." It then shews,

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[1] Pslam cxxxix. 15, 16.

[2] DE LUC, *Lettres Géologiques,* p. 5.

" that in each there must be both *materials* and *operation;* but it forgets, that in the pyramid, the *materials* must precede the *operation;* whereas, in the mountain, the *operation* must precede the *materials.* In the *pyramid,* there must be materials before the artificers can act; in the *mountain,* the Artificer must act before there can be materials. In the one case we are led to inquire, from whence did the artificers *procure* the materials? but, in the other, how did the Artificer *produce* the materials? that is, *what was the* MODE *of their first formation?* What *true* analogy, then, can there be between the two cases, if closely examined? But, from not examining them closely, and from limiting its view to a vague resemblance between the *strata of soils* in mountains and the *layers of masonry* in pyramids, the mineral geology contents itself with that vague resemblance; and it concludes, " we should indeed be very far " behind hand in geology, if we were not *able to* " *discover from whence the materials proceeded of* " *which those strata were formed*[1]." And, from whence does it at length " *discover*" that they did proceed? From " *a confused assemblage of* " *elements, of which water was the basis; and it is* " *from this first mixture, that all substances what-* " *ever, which engage our observation or experience,* " *formed themselves*[2]." And this " *discovery,*" is to be imposed upon us as a result of " *the happy*

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[1] De Luc, *Lett. Géol.* p. 7.

[2] See above, p. 26.

" *revolution effected by Bacon and Newton in the* " *studies of the natural sciences!*" Of the propounders of such *discoveries,* we may with truth pronounce; φασκοντες ειναι σοφοι, εμωρανθησαν— " *professing themselves to be wise, they became* " *infatuated.*"

But, says the mineral geology, " every proposition in the physical sciences, which does " not result simply and immediately from the observation of a *manifest fact,* can only be an " *induction* drawn by *analogy* from facts which " are known; this is an incontestable principle " of all sound logic[1]." There can be no doubt of the truth of this maxim; but, the *validity of the induction* must depend, entirely and absolutely, upon the *soundness of the analogy.* Every degree of unsoundness in the *analogy,* will impart its vice to the *induction;* and, as the preceding analogies proposed, between the *modes* of *first* and *secondary* formations, are utterly and palpably *vicious and unsound,* so must the *inductions* deduced from them be *vicious and unsound* also.

The mineral geology does not seem to be at all aware, how *baseless* a fabric it constructs, in founding its doctrine of *first mineral formations* on *secondary causes.* " The first basis of geology " founded on *facts,*" says de Luc, " is certainly " an exact knowledge of the mineral strata, " which compose the mass of our continents

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[1] D'AUBUISSON, tom. ii. p. 603.

" subjected to our observation; for, these strata, " *the formation of which has entirely ceased,* must " have been *the effect of primordial causes which* " *no longer subsist*[1]." To the same purpose D'Aubuisson, but with greater consideration: " *The nature of this cause, and the manner in which* " *it acted, are most likely removed for ever from our* " *knowledge: no effect of the same kind is ever now* " *produced:*—all the circumstances of the division " of the mineral masses into beds and strata, " both in their primitive and actual states, are " *very far from being known to us;* and, in con- " cluding this subject, we are constrained to say, " that to determine respecting stratification, its " circumstances and its laws, *still remains a* " *problem to be resolved, and is perhaps the most* " *important one in geognosy*[2]." Thus also Cuvier: " We are in the *most absolute ignorance,* respecting " the *causes* which have occasioned the diversity " in the substances of which *strata* are com- " posed; we are unacquainted *even with the agents* " which may have held some of them in solution; " and it is *still disputed* respecting several of " them, *whether they owe their origin to the agency* " *of* WATER, *or of* FIRE[3]."

That every *effect* must have a *cause,* is a truth which all the evil ingenuity of Hume could not invalidate; for, he confirmed it whilst he laboured to impugn it, by proving, that he himself was striving to render his own *sophistry the cause* of the *effect of scepticism* in others. But, it does not necessarily follow, because *every effect* must have *a cause*, that *every sensible physical effect* must have a *secondary physical cause;* we know that there must have been, and there still must be, many *sensible physical effects* which can only be ascribed to a *first physical cause*, and we have found, that the *first physical cause* is the *Creator*. Nothing can be more *unphilosophical* (not to say *absurd*,) than to lay it down as an axiom, that all *sensible phenomena*, necessarily, and in the essential nature of things, imply the action of a *secondary cause*. We might as well argue, that the *point commencing every mathematical line*, proves the *termination of a preceding line*, as apply that axiom to *primitive phenomena:* if any such *phenomena* exist, it would be an abandonment of common sense to ascribe them to *secondary causes;* and, that they do and must exist, common sense has perfectly recognised.

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[1] *Lett. Géol.* p. 72, *note.*

[2] Tom. i. p. 352.

[3] *Disc. Prél.* p. 27.—*Th.* § 23.

But, in order to establish the legitimate relation of cause and effect *subordinately to the First Cause*, it is indispensably necessary, either that the cause should have been known *in course of actual operation*, or the effect *in course of actual production;* in either of which cases, we may securely pronounce of the relations of *cause* and *effect*. To these alone, Newton assigned the scientific denomination of *phenomena;* and he affirmed, that

" whatever cannot be deduced from *phenomena*,
" is to be called *hypothesis*; and that *hypotheses*,
" whether metaphysical, physical, of *occult quali-*
" *ties*, or mechanical, are *not to be admitted in*
" *experimental philosophy*[1]." But, if *neither of these* have ever been known, how fundamentally hypothetical must be the relation alleged? And, who ever knew a *granite rock in course of production*, or a *menstruum exhibiting a cause capable of producing it?* The mineral geology says, that it *infers it;* because, the crystalline composition of rock *must have had a cause.* So must the calcareous composition of bone, and the fibrous composition of wood, *have had a cause;* but, if it was *first formed, created bone*, or *first formed, created wood*, it most assuredly had not a *secondary* physical cause, whatever were the *appearances* which the mineral geology call *phenomena;* and, if it is *first formed, created rock*, it had not a *secondary* physical cause, whatever are its *appearances.* Yet we know, that there are now secondary causes which produce *bone* and *wood;* but, we know of no secondary causes that produce *granite.* And, the reason appears to be obvious: for, the *animal and vegetable creations* were to subsist *by succession to the first formed individuals*, and therefore, laws for securing that succession, by the multiplication of individuals, were necessary: but, the *granitic frame-work of the globe* was

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[1] *Pr. Math. Schol. General.*

to subsist, *permanently in its first formed individuals;* therefore, no laws of succession and multiplication were necessary to its system. And, from this consideration alone, accrues a perfect *moral assurance;* that the *first mineral formations* which are *still permanent,* were formed by no other *mode* than that, which formed the *first animal and vegetable formations* which have been *succeeded by generation.*

When, therefore, the mineral geology ascribes the *first formation* of granitic rocks to the mode of crystallisation in a *fluid,* by aqueous action, or in a *paste,* by igneous action, it assumes an *effect* which was never known *in course of production,* and explains it by an *assumed cause,* which was never known *in course of operation.* And, what is this in *philosophy,* but assuming an *occult cause;* and in *reason,* but assuming a *fiction* instead of a *fact,* for the *basis of a science?* For, the *water-geologist,* who maintains the crystallisation of granite by *water,* is obliged at the same time to acknowledge the *fact,* of crystallisation by *fire* in some instances; and, since we have never witnessed the crystallisation of granite *at all,* either by *water* or by *fire,* the system that would determine the mode of its formation to the one or the other, *absolutely* and *exclusively,* can have no *real foundation.*

The *water-geologist,* indeed, ascribes all formations, primary and secondary, to *water,* whilst the *fire-geologist* ascribes them all to *fire;* which decisions resemble "*the glorious uncertainty*," irreverently ascribed to the Law; and have given occasion to an eminent chemical philosopher to observe: "geologists arrive at conclusions *diametrically opposite;* upon which a clever writer remarks, 'that among all the wonders geology presents to 'our view, the *confidence of the theorists* is the 'most unaccountable[1].'"

But, there is still room for *fancy* to play between *the two;* for, why might not those formations be ascribed to both agents, *in succession?* Why might not the *primary* formations have been caused by *fire*, and the *secondary* by *water?* Why, after a mineral globe had been formed by *igneous fusion*, might not a revolution have been effected by an *aqueous fluid?* for we are certain of the existence, and the power, of both those agents in the globe. Why, then, are we to contend for the one or for the other, exclusively? and why might they not both have operated *in succession?* Here is still a ground-plot left, to attempt the raising a new system of *alchymical geology*[2]. The argument is so entirely and essentially *hypothetical* on both sides, that this last supposition may be just as defensible as either of the other two. The neptunian has established the fact against Hutton, that *secondary* formations are of *aqeous* production, by shewing, that the perfect preservation of shells in the secondary strata could not have taken place, if the revolution which transported them thither had been effected by *fire;* for, the shells, being calcareous, must have been dissolved, and mingled with the general mass[1]. But, he would infer *from thence,* that *primary* formations must likewise have been of *aqeous* production[2]; which is more than his premises can yield. He has refuted Hutton, indeed, in the one argument, but he has left him as strong as ever in the other: and yet, not a whit stronger than himself; for, the force of their arguments is so nearly poised and balanced, that they neutralise each other. The result is, that there will remain for ever a ground of *hypothetical contest* between the two. And therefore, as there exists no accessory weight of *truth* to determine the scale *definitively* on either side, the just conclusion is, that *both* are equally in error with respect to the *fact;* consequently, that "*the crystal-*" *line character stamped upon the primitive mineral*

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[1] BRANDE, *Manual of Chemistry*, vol. iii. p. 230.

[2] It appears from the recent treatise of M. Humboldt, published since this observation was first printed, that such is actually the theory of that celebrated mineral geologist or geognost. Though he sees proof of ancient *aqueous action* in "the fragments imbedded in the stony beds, "and in the crystalline aspect of the masses;" yet, "he does not hesitate to range himself on the side of those who rather conceive the "*formation* of crystalline siliceous rocks by *fire*." He condemns a sort of *conciliatory theory*, that would *combine* the action of both agents, by attributing mineral formations to *heated-water*; which he calls "a pre-

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" tended *aquoso-igneous liquefaction*" (*Superpos. of Rocks*, p. 67 and 407, 408): an agent, nevertheless, which has probably operated with a mighty energy, in some of the *secondary* formations of the globe. See Note [III.] *On M. Humboldt's Theory of Rocks.*

[1] D'AUBUISSON, tom. i. p. 381.

[2] Ibid. p. 388.

"*masses*," was not stamped by either of the *secondary causes* assigned; but, that it was impressed by the *First Creating Cause*, who anticipated the effects of each, when He *gave to those masses, by crystalline composition, "the properties "which most conduced to the end for which He "formed them.*"

A principal and obvious "*end*" of those "*pro-"perties*," as we have seen, was the *solidity* and *durability*, resulting from the grain and texture of that composition, essentially requisite for the *uses* of the globe; so that the granite summits traversed by Hannibal 2000 years ago, are identically the same which we now witness; and we are sure that they stood identically the same, nearly twice 2000 years before him. Whatever may be the destructive and wasting power of *atmospheric agents* upon some bodies, it is absolutely *null* with respect to *these*, and therefore it is idle and unphilosophical to take account of it in geology. And, how then is it possible, to contemplate the admirable artifice by which these *perfect means* conduce to their *perfect end*, without "*rendering immediately "to* GOD, *the things which are* GOD'S!"

CHAPTER IX.

IT is revolting to *reason,* and therefore to *true philosophy,* to observe, how strenuously *physical science,* though expatiating in the wonders of *Creation,* has laboured to exclude the *Creator* from the *details* of His own Work, straining every nerve of ingenuity to ascribe them *all* to *secondary causes;* and, with what undisguised *relief of thought,* it exchanges the idea of *God,* for the idea of *Nature*[1]*!* Can it be aware, that in so doing it is moving in the very direction which leads, and which ever has led, to *materialism,* practical if not systematical; and therefore, in the very *opposite* direction to that in which Bacon and Newton, of whom it makes its boast, always moved? And, that in every degree in which it despoils *the Creator,* in order to furnish the fiction which it extols under the unmeaning term of *Nature,* it in the same degree disclaims the philosophy of Bacon and Newton, and sanctions the doctrine of *Epicurean atheism?* for, the atheism of Epicurus was not *a denial of Deity,* but a denial of the *action and interference of Deity.*

How different was the proceeding of Newton! who declared, " When I wrote my treatise about

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[1] See above, note to p. 105.

" our system, *I had an eye upon such principles* as might work with considering men *for the belief of a Deity*[1]:" that is, an *intelligent*, *interfering*, and *operating Deity*. Hence it was, that he taught: " HÆC OMNIA, *simili consilio constructa*, suberunt UNIUS dominio:—HIC omnia regit, non ut *Anima Mundi*, sed ut universorum Dominus; et propter dominium suum, Dominus Deus Παντοκράτωρ dici solet. Nam *Deus* est vox relativa, et ad *servos* refertur; et deitas ac dominatio Dei, non in *corpus proprium*, uti sentiunt quibus Deus est *anima mundi*, sed in *servos*[2].—ALL THESE THINGS, *constructed by the same Wisdom*, are subject to the dominion of ONE alone. HE, rules them *all*; not as *a soul of the world*, but as the Lord and Master of the universe; and, on account of his own proper dominion, He is called, *the Lord God Almighty*. For *God*, is a *relative* term; and relates to *servants*, or *ministers*; and the *godship* and domination of God is, not over *His own frame*, as those supposed who considered Him only as the *soul of the world*; but, over His *servants* or *ministers*."

But, does the *mineral geology* exhibit any demonstration, that it " *has an eye upon any such principles*" in the management of its science?

It is with much concern that I have to adduce, in proof of the justice of the preceding remarks, the very recent, and in a merely scientific point of view, the very wonderful "*Essay* "*on the Superposition of Rocks in both Hemi*-"*spheres.*" Yet, that work is not so wonderful for the unparalleled labour which it evinces, and for the vast comprehension of its *physical combinations*, as it is for the *moral phenomenon* which it exhibits: a work, scrutinising the amazing structure of this globe with a minuteness and universality never before attempted; compelled, by its subject, to look back occasionally to the "*first* "*period and origin*" of that structure; professing, "*in presenting the details of the phenomena, to* "*generalise the ideas respecting them — to connect* "*them with the great questions in Natural Phi*-"*losophy*[1] *— and to trace the first elements of geo*-"*gnostic philosophy*[2];" and yet, without embracing a *single* reflection rising above the brute matter with which it is engaged; without a single allusion to a *divine cause* or *first principle*; without the most transient homage of the mind evinced by the teacher before his pupil; alleging *Nature* twice or thrice, but propounding no other *primary principle* of its "philosophy" than that of "*de*-"*velopment*," common to minerals, animals, and vegetables; and therefore, having no "*eye upon those* "*principles*" which Newton kept ever in his view in handling the "*great questions of Natural Phi*-

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[1] *First Letter to* BENTLEY. [2] *Princip. Math.* lib. iii. *Schol. General.*

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[1] *Pref.* p. vi.

[2] Page 42.

"*losophy.*" That such an exclusion is violently *artificial,* is too manifest to be disguised, because the mind of every one will feel that it is totally *unnatural;* and, that which is *unnatural to the intelligence,* can never be *philosophical.* It appears to be resorted to, from a rising sense of the absurdity of *chaotic geology;* and from a vain expectation, that a negative course, *excluding the absurdity,* will alone *establish rationality.* But, this will not do. The point must now be determined *positively;* and this we have effected, by means of the demonstrative truth to which we have attained—*that the primitive formations in all the three kingdoms were perfectly analogous, with respect to the completeness originally imparted to them, by their divine efficient Cause.*

"An undevout *Astronomer* is mad!"

said our moral poet, in an age when astronomy was the branch of natural philosophy that chiefly excited the interest of science. Had he lived in our days, to see that interest extended to the amazing field of geological research, he might have pronounced, with equal poetical force and justness,

"An undevout *Geologist* is mad!"

It is in vain for the mineral geology to say, that it *presupposes* a First Intelligent Cause; and therefore, that it is *unnecessary to propound it.* It is indispensably necessary to propound it, like Newton; and not only to propound it, but to proclaim it, like him; and not only to proclaim it once, and then to have done with it, but to recur to it *repeatedly* and *constantly*, like him, *as a first principle* never to be lost sight of; that in so intricate and dangerous a labyrinth, the mind may *hold fast* by it as a clue never to be relinquished: lest, if it should once *lose that clue*, it should stray further and further from the only secure road, into the gloomy entanglements of *error;* and should become ultimately lost, in all the horrors of *moral darkness.* He who professes to teach the *first elements of a science*, is understood to ground it upon the *first principle* which he propounds; and, when that science embraces one-third part of terrestrial creation; when the *first principle* which it propounds, is only *nature and her chemistry*, or *nature and development;* when that nature is personified, and creative acts (which are *intelligent acts*) are ascribed to it; such doctrine is fundamentally *unscientific and unphilosophical*, if brought to the test of Bacon and Newton, and essentially *profane and impious*, if brought to the test of Revelation. Nor is it sufficient to denounce and disclaim it generally, as being "confined to those "who have presumed to compose theories of the "earth *in the infancy of the science*[1]," and then to dismiss it from the thought, as unworthy of its entertainment; which only marks *individual superiority;* it is necessary, on the contrary, it is imperative, to bring it distinctly under observation and inquisition, to inspect it narrowly, and to expose it radically; that it may not, like an ill-healed sore, be left to work its corruption in secret, and to break out afresh. For, we have very sufficiently seen; that (whatever may be the peculiar opinions in geology of the enlightened writer just quoted, and of some other individuals amongst us,) the doctrine which I have exposed is *not confined to the infancy of the science*, but flourishes widely and vigorously in Europe, in its *present overweening adolescence*. Overtly, or covertly, it is inherent in the *root* of the mineral geology; and must continue there to live, so long as the neptunian and vulcanian geogonies shall continue to contest with Intelligent Creative Power, the MODE *of primitive formations*.

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[1] *Vindic. Geologicæ*, p. 22.

It is manifest, that the mineral geology, *considered as a science*, can do as well *without God*, (though in a question concerning the *origin of the Earth*,) as Lucretius did; and that, like him, it would relieve God from all personal trouble in producing the wonderful *primitive arrangements* of this globe. Like Lucretius, it says in effect:

> Quæ bene cognita si teneas: *Natura* videtur
> Libera continuo Dominis privata superbis
> *Ipsa sua per se sponte omnia Diis agere expers*[1]:
>
> If then you'll understand, you'll plainly see
> How the vast mass of matter, *Nature* free
> From the proud care of th' meddling Deity,

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[1] Lib. ii. 1066.

Doth *work by Her own private strength, and move*
Without the trouble of the powers above.—CREECH.

but, “ *The Creator of the ends of the earth fainteth* “ *not*[1]*!*” It may cry out at the assertion; but it will not be at calumny, but at the *discovery of a truth of which it was unaware.* All that it requires *scientifically*, is the *presence of unordered matter*, with freedom to submit it to *Nature* and *Her chemical processes.* It signifies little, to every *overt end which it propounds*, whether it finds that confused matter existing from eternity, or whether it obtains it in the form of *a spheroid of elemental mud*, or *paste*, produced by no very intelligent power. Like Lucretius, it again says, in effect;

———quom *materies* est multa parata,
Quom *locus* est præsto, nec *res* nec *causa* moratur
Ulla, *geri debent nimirum, et confieri res*[2].

With *matter* ample, *space*, and *causal force*,
Formation follows as a thing of course.

There is no doubt, that by submitting its *mud*[3] to its *process*, it might make for itself a very ingenious *mineral earth* in the laboratory of its

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[1] Isaiah, xl. 28.

[2] Lucretius, ii. 1068.

[3] This *mud*, is a very venerable *geological antique;* it is no other than the *μωτ*, *mot*, of the old Phœnician *cosmogony*: “ MOT, *limum* nonnulli, alii “ *aquosæ mixtionis* putredinem esse volunt. Hinc factum est *seminium* “ omnis creaturæ, et *omnium rerum creatio.*” (BRUCKERI *Hist. Phil.* tom. i. p. 240.) “ Some explain MOT to signify *mud*; others, the fer- “ mentation of a *watery mixture.* Hence, it became the *seed-bed* of every “ creature, and the *creation of all things.*” In what does this doctrine differ from that of the *mineral geology*, exposed above in Chap. III.?

imagination; but then, it could never succeed in clothing that earth with *vegetation,* nor in peopling it with *inhabitants,* with all its ingenuity and all its *chemistry.* And therefore, since that is the case, it may assure itself; that, until it shall assign *a* MODE *of first formation* which can, not only *crystallise a mineral earth,* but moreover *attach to it when crystallised an investiture of vegetable and animal life,* it has *not apprehended the* TRUE MODE *of the first formations of this mineral globe.*

Deduct from the *intelligence* of a First Cause, and we sap our *rational belief* of a First Cause in the same proportion. It is in vain to say, that the wisdom which we extol in the *laws of Nature,* we ascribe ultimately to the *Author of Nature;* for, His intelligence is questioned, in proportion as *secondary* causes are supposed to execute functions which *reason* sees to pertain exclusively to a *First Cause.* To assume arbitrarily, *à priori,* that God created the matter of this globe *in the most imperfect state to which the gross imagination of man can contrive to reduce it,* which it effectually does, by reducing the creative *Fiat* to the mere production of an *amorphous elementary mass;* and then to pretend, that His intelligence and wisdom are to be collected from certain hypothetical occult laws, by which *that mass worked itself into perfection of figure and arrangement after innumerable ages;* would tend to lessen our sense either of the divine *wisdom* or *power,* did not the supposition recoil with tremendous reaction upon the *supposers*, and convict them of the clumsiest irrationality. The supposition, is totally *arbitrary;* and not only arbitrary, but *viciously* arbitrary; because, it is totally *unnecessary*, and therefore betrays a *vice of choice*. For, the laws of matter could not have *worked perfection* in the mass which the Creator is thus supposed to have formed *imperfect*, unless by a power imparted by *Himself* who established the laws. And, if He could thus produce perfection *mediately*, through their operation, He could produce it *immediately*, without their operation. Why, then, wantonly and viciously, without a pretence of authority, *choose* the supposition of their mediation? It is entirely a decision of *choice and preference*, that is, of *the will;* for, *the reason* is no party in it, neither urging, suggesting, encouraging, or in any way aiding or abetting the decision, but, on the contrary, positively denying and condemning it. The *vast length of time*, which this sinistrous *choice* is necessarily obliged to call in for its own defence, could only be requisite to the Creator *for overcoming difficulties obstructing the perfecting process;* it therefore *chooses to suppose*, that He *created obstructions* in matter, to resist and retard the perfecting of the work which He designed; whilst at the same time he might have perfected it without any resistance at all, by *His own Creative Act*.

Or, does the *mineral geology* form its notion of the Creator by so abject a standard, as to imagine, that His infinite intelligence created for Himself an *interest*, or an *amusement of curiosity*, in watching the precipitation and crystallisation of the elements of His muddy spheroid during a flux of ages; merely because *itself* watches for several hours, with patient and solemn sagacity, the progress of crystallisation in *its own phial?* and, that the difference of the two cases, consists chiefly in the differences of *quantity* and *time?* In fact, *it reasons from itself to the Creator*. But, *why* does it wait all those hours for its crystals? because it cannot have them any *sooner*, and is therefore *obliged* to wait for them; because it is constrained by *laws which it cannot control*, and to which it must therefore fain submit. If it was equally in its power, to obtain the crystals by a process causing several hours' delay, or by one that would yield them to it at once, which would it deem the *most intelligent* election for *itself* to make? If it would not *choose* the former, *why* is it, arbitrarily and without any suggestion from reason, to ascribe such *choice* to the Intelligent Creator? It will, probably, reply by the futile argument, that there is no such thing as *time*, no *delay* or *acceleration*, with respect to *God*. But, it establishes no right to that idle subterfuge; for, the *previous question* is refused it. Yet, grant it the right; and the argument will be found most shallow and ineffectual. No doubt, there is neither delay nor acceleration with relation to *God Himself;* but, with respect to *His creation,* there is always that *relation of time,* which He has Himself demonstrated to be *the rule of His counsels with respect to this earth;* and it argues a great infirmity of reasoning, not to perceive the incongruity and inconsistency of ascribing *innumerable ages* to the precipitation of a *brute globe,* the great *moral interests* of which were to pass away with such comparative *rapidity.*

But, those *laws,* which the mineral geology supposes to have required so many ages for precipitating and crystallising the primordial rocks and primitive substances of this earth, did not control the Creator; since they must have been of His own enactment. To suppose then, *à priori,* and without the slightest motive prompted by *reason,* that His wisdom willed, at the same time, both the *formation* of a perfect work, and a series of resistances to *obstruct* and *delay* that perfect work, argues a gross defect of intelligence *somewhere;* either in the *Creator* or in the *supposer;* and I leave it to this science, to determine the *alternative.* "*Nature,*" it says, "has *time* at *her* disposal, it "is nothing to *her;* to *her,* it is as indefinite as "*space*[1]:" it would better have said, that the *mineral geologist* has time at the disposal of *his* extravagant and undisciplined fancy, and that it is nothing to *him.* But, since physical science has of late been compelled, by the progress of physical research, to acknowledge, that all the great and multitudinous events which fill up the histories of the nations occupying the present surface of our globe, have fallen within a compass of time not exceeding that which has elapsed since the Mosaical epocha of the *Deluge;* it might have acquired a sense of the absurdity of supposing, that innumerable ages were employed in laying the *pavement* of a theatre, on which so brief a *drama* was to be transacted. *Sound philosophy,* contemptuously rejects such an auxiliary as *time,* in concluding of *the* MODE *of first formation.* It is not *needed,* for the service of *truth;* but, merely to lend a helping hand to *physical adventure,* when it has rambled beyond the light of truth. If *time is nothing to God,*—and this is the only rational meaning that can be bestowed upon the phrase, "*time is nothing to Nature,*"—it is evident, that *He has no need of it;* and it is much more philosophical in that case, to suppose, that *He did not employ it in* FIRST FORMATIONS, than to suppose, that *He employed it profusely and prodigally, when He did not need it.*

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[1] See above, p. 29.

It is a singular fatality, and a fact pregnant with most instructive virtue, that the *mineral geology,* whilst it lays claim to a rank in the school of Newton, should nevertheless have lapsed into the very error against which he warned it; viz. "the "derivation of this admirably ordered globe from "*the elements of a chaos,* by the mere *laws of Na-* "*ture;*" and, that it should thus have concluded by attracting to itself the very stamp, of "*unphi-*" *losophical*," which Newton had posted up as the *term of his warning*. This, however, has resulted necessarily from the causes which have been exposed; namely, its delusion with respect to *primitive phenomena*, and its consequent defective and unskilful employment of the method of *analysis* and *induction*, in laying the basis of its science. By not rendering the analysis *universal* and *complete*, in imitation of Newton, it failed to *ascend to the common cause of the first formations of all material things*, and to combine them all *in equal relation to that cause;* and it thereby excluded from its philosophy every *moral* principle, limiting its speculations to *physical* principles only. "The " human mind (it has been truly remarked) has " an appetite for truth of every kind, physical *as* " *well as* moral; and the utility of *science* is to " afford gratification to this appetite[1];" but, in order to gratify it salutarily, it is important in the first degree, that those *two kinds* of truth should not be presented to the mind as *dissociated*, or as constituting systems *essentially distinct from, and independent of, each other*. It is, evidently, from having so dissociated them, that M. Humboldt thus formally excludes from his system of geognosy, a *common cause*, or *first universal principle*: " As we are ig-" norant (he says) of the *primary cause of pheno-*" *mena*, Natural Philosophy, of which *geognosy*

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[1] *Vindic. Geologicæ*, p. 5.

" will one day form one of the most interesting " parts, ought to *stop at the knowledge of laws*[1]."

It is exactly in this *stopping*, this exclusion of *moral principles*, that the mineral geology demonstrates itself to be altogether alien from Newton; who, when he ascribed the phenomena of our planetary system to a common secondary cause, referred that secondary cause, immediately, to the primary causation of the *Divine will and power*, as the *primary principle* without which it would be inoperative, and *barren of all phenomena*. His Natural Philosophy did not "*stop at the knowledge " of laws, through a professed ignorance of the pri- " mary cause of phenomena*;" but, it "*concluded of " the primary cause from the phenomena—de* DEO " *ex phænomenis*." When he traced the concentric planetary revolutions to *gravitation*, and gravitation to *God*, the " utility of his science" was infinitely greater in its *ultimate* term, than in its *penultimate*; because, it shewed the absolute dependance of the *physical* system on the *moral*. The mineral geology concludes from *physical principles only*, Newton concluded from *physical principles always subjected to moral*; and, from the differences of these methods, has necessarily resulted *the opposition of their respective conclusions*. In the intuitive logic of Newton's mind, *morals* and *physics* were indissolubly *articulated together*, and *terminated jointly in* GOD. Newton held the connexion of *natural* and *moral philosophy* to be so intimate, that the latter must necessarily be extended by the sound extension of the former; so that if it be not proportionately extended, all extension in the former is unsound and vicious. "If," said he, "*natural philosophy*, in all its parts, by pursuing "this method (*analysis* and *induction*), shall at "length *be perfected*, the bounds of *moral philosophy will be also enlarged.* For, so far as we "can know by *natural* philosophy what is the "FIRST CAUSE, what power HE has over us, and "what benefits we receive from HIM, so far our "*duty* towards HIM, as well as that towards "one another, will appear to us by the *light of* "*Nature*[1]."

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[1] *Superpos. of Rocks*, p. 74, 75.

And it would be so advanced by *geology* also, were it perfected according to Newton's philosophy; concluding from *universal analysis*, to a *First, Common, and Intelligent Cause*, "*creating, and* "*setting in the order most conducive to the ends for* "*which He formed them,*" *every first formation of His universe. Physics* and *morals* are, to the corporate sum of human knowledge, what the *vascular* and *nervous* systems are to the animal body. Where the animal frame is perfect, those systems inseparably and equally accompany each other, in all their processes and ramifications. The vascular system, supplies substance and bulk; the nervous, sense and conscious life. We know, that the vascular system may supply *bulk* beyond the extent of the nervous branches, or, after they have perished; but, all those parts are without sense and feeling. And so also, in the body of human knowledge, are all those elongations of *physical science* which grow beyond the growth of the *moral knowledge;* with which they ought always to preserve a parallel, either by not attempting to exceed the moral measure, or by being careful to cause the moral branch to grow in equal proportion with the physical. Otherwise, they shew only as the *monstrous*, or the *paralysed*, members of the system to which they pertain.

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[1] *Optics*, lib. iii. *in fin.*

But, what growth or advancement can *moral philosophy* acquire from mineral geology, proceeding from *imperfect and defective analysis* to a conclusion of *Nature*, personified, and invested with the attributes of *deity?* Such a conclusion shuts out the *First Cause*, the *First Physical and Moral Principle*, from the mental view; and substitutes in its place a *counterfeit power*, to receive all the homage of the mind. The *existence* of that First Cause, may perhaps be adverted to, generally and remotely, but He is never contemplated in actual and immediate operation, and is presently consigned to Epicurean repose and inaction; and the *physical philosopher*, having discharged the preliminary formality, deems himself at liberty to proceed without Him, and to speculate in full freedom on the laws of *matter* or of *nature*. If this is Newton's philosophy, it is

Newton's philosophy palsy-struck.—Τουτο ουκ εποιησε[1], "*this did not,*" Newton!

Philo remarked, (as if it were proleptically of the *mineral geology,*) "*that there were those who were* "*more engaged in admiring* THE WORLD ITSELF, "*than the* Maker of the world; *and who* "*falsely attributed to Him, an* INACTION *in it:*— "τινες τον κοσμον μαλλον η τον Κοσμοποιον θαυμαζοντες—του "Θεου πολλην απραξιαν ουκ ευαγως κατεψευσάντο:" and he cautioned them, "*not to reverence it* IMMODE- "RATELY"—μη πλεον του μετριου αποσεμνυναι[2], lest it should draw aside their contemplation from that which should principally engage it; namely, its *First Cause* and *Omnipotent Creator.* It is offensive, to observe how commonly this is the case in the *natural sciences,* even at the present day; although we are existing in a *focus,* in which are combined and concentred all the *united lights* of reformed philosophy and of revelation. Such determined averseness to admit *God,* as the *First physical principle* and *Sole Cause of all primitive phenomena,* in the pale of sciences wholly conversant in *His own works,* can only be paralleled by the conduct of our first parents immediately after the *Fall;* when "*they heard the voice of God,* "*and hid themselves from His presence among the* "*trees of the garden.*" Equally unhallowed is the demonstration which the *natural sciences* make, when they abandon Newton proclaiming God as the *immediate cause*, not only of the *existence* but of the *order* of all *first formations*, and the *first* principle *moral* and *physical*, in universal science; and when they palm upon us *Nature*, as His *proxy or substitute*. An heathen philosopher could discover, that *Nature* can be no other than *God*.—" A man " says, *Nature gives me these things:* (exclaimed " Seneca). Do you not perceive, that when you " say this, you only *change the name of* GOD? " For, what is *Nature* but GOD, and *the divine* " *reason* infused into the whole world and all its " parts[1]?"—" I have often wondered, (said the " excellent Boyle, above a century ago,) that in " so inquisitive an age as this, among those " learned that have, with much freedom as well " as acuteness, written of the *works of Nature* (as " they call them), and some of them, of *the principles* too, I have not met with any that has " made it his business to write of *Nature herself*. " This will perhaps, hereafter, be thought such " an omission, as if one should particularly treat " of the barrel, wheels, string, balance, index, " and other parts of *a watch*, without examining " the nature of THE SPRING, *that sets all these a-* " *moving*[2]." We have not much improved, since Boyle wrote this admonitory censure; for we have seen, that the *mineral geology* speaks of *Nature*, at the present day, in terms that would have provoked the natural theology of Seneca. An eminent mineral geologist asks; "*Why should not natural* "*history one day have its Newton*[1]*?*"—There is no reason why it should not: but, this we may venture to affirm, peremptorily; that it will never have that Newton, unless, following in the steps of his illustrious prototype, he shall so conduct his science, as to conclude, from the most general analysis, to the wisdom and power of an Intelligent Agent, as the *immediate cause* both of the *being* and *perfect arrangement* of all *first formations;* and, unless his *natural philosophy* shall proceed by a course, which shall at the same time equally advance the progress of *moral philosophy*.

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[1] John, viii. 40.

[2] Philo, tom. i. p. 2.

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[1] SENECA *de Benef.* lib. iv. cap. 7. " *Natura*, inquit, hæc mihi præstat. " Non intelligis te, cum hoc dicis, *mutare nomen Deo?* Quid enim est " *natura*, nisi DEUS, et *divina ratio* toti mundo et partibus ejus inserta?"

[2] *Free Inquiry into the Received Notion of Nature. Pref.*

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[1] CUVIER, *Disc. Prél.* p. 3.—*Theory,* § 1.

CHAPTER X.

We have now finally determined the great question, concerning *the authority of sensible phenomena for deciding the* MODE *of first formations in the mineral kingdom of matter*, by applying the same question to the *animal and vegetable kingdoms;* and, *sound philosophy* clearly perceives, that their authority is exactly the same in *all the three;* and, that the mineral geology can advance no one plea in objection, for its own kingdom, which might not have been equally advanced, and with equal futility, by anatomy and natural history, for the two other kingdoms. It therefore concludes of the "*skeleton* "*or frame-work of this earth,*" the "*magnæ ossa* "*parentis,*" as it concludes of the *skeleton or frame-work of created man:* That it was not produced by any *secondary cause,* but, by the *immediate, incomprehensible act of the First, Intelligent, Omnipotent Cause;* and, that it is *unphilosophical* to seek any other origin for its *form* and *composition,* or to pretend, that these might have arisen out of a *chaos, chaotic ocean, amorphous mass,* or *confused assemblage of elements,* by the *mere laws of Nature.* And thus, the whole order of *first mineral formations,* or *primitive rocks,* are withdrawn for ever from the speculations of the mineral geology, with respect to the *mode* of their production; so that, from henceforth, it can only exercise those speculations *philosophically* upon that remaining order of minerals, which, by bearing incontestable evidence of *alteration*, either by *chemical decomposition and recomposition*, or by *mechanical action*, prove themselves to be absolutely distinct in circumstance from the former.

" To *what cause*, then, (it will exclaim,) are " we to ascribe the regular successive *strata* in " all *primitive* mineral formations, previous to the " disturbances of which they bear the evidence?" —I ask, in reply: To *what cause* are we to ascribe the regular successive *laminæ* in the shell of the *first tortoise*, or the regular succesive *folds* in the wood of the *first tree?* The *final cause*, in each, was the *end* to which it was to serve; the *efficient cause*, was the *Intelligent Power* which sought those *ends;* to Whom, all created magnitudes are equal. " We can scarce fail to inquire " (observes the able author of the *Vindiciæ Geo-*" *logicæ*,) whether we shall find in the *mineral* " kingdom of nature the same *subserviency to final* " *causes* which are so strikingly exhibited in the " *animal* and *vegetable* creation; and the answer " will be found to be in the affirmative[1]." The answer has also been found to be in the affirmative, with respect to an *equal primitive provision for that subserviency* by the *common efficient cause*, in the first individuals of *all the three kingdoms.*

" To *what cause*, it will again exclaim, are we to " ascribe the primitive characteristical diversities " of *granite, gneiss, mica-slate, porphyry, serpentine,* " &c.?"—I again reply, by asking: To *what*

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[1] Page 11.

cause are we to ascribe the characteristical diversity, of the *ivory* of the *first elephant* and the *horn* of the *first elk;* of the *wool* of the *first sheep* and the *fur* of the *first ermine;* of the *whiteness* of the *first swan,* the *blackness* of the *first raven,* and the *diversified colours* of the *first peacock?* Those were *first formations then,* as the *granite,* the *gneiss,* and the *mica-slate, continue to be first formations now.* To *what cause* are we to ascribe the diversity, of *spots* in the *first formed panther,* of *stripes* in the *first formed tiger,* and of a *plain hide* in the *first formed lion?* To what are we to ascribe the differing textures, of *bone, cartilage,* and *muscle,* in the *created animal?* We might as well ascribe all these, to differences of *secretion* and *accretion* which never took place, as the diversity of *primitive rocks,* to differences of *precipitation* or *development* which never took place. Of *true first formations,* the cause of the *being* and of the *diversity* must be the same. Are not *use, beauty,* and *variety,* manifest *ends* in this creation? and, if they are so in the *vegetable* and *animal kingdoms,* why are they not to be the same in the *mineral kingdom?* and, why are we not rather to ascribe to the *design of the Creator,* "those associations in which alternating "primitive rocks exhibit a great *contrast of crys-"tallisation, mixture, and colour,*" which M. Humboldt ascribes altogether to the "*delight of Na-"ture*[1]*?*" And, as the Creator at first planted the earth with every tree, not only "*good for food,*" but also "*pleasant to the sight,*" that is, *the sight*

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[1] *Superpos. of Rocks,* p. 41.

of man; as He adorned its *exterior* with the gaiety and variety of flowers, and enlivened it not only with melody of sounds but likewise with mixture, contrast, and splendour of colours; so He provided its *interior* with various mineral substances both of use and beauty, to be afterwards drawn forth to light by the activity and industry of man; imbedding within it His treasuries of ores and gems, and causing to rise above its surface the useful and beautiful varieties which are found amongst His *primitive mineral formations.* The philosophy of Bacon and Newton, will never consent to derive these from an *elementary chaos.*

I know, that the *mineral* geology wishes to establish an *essential distinction of principle and operation,* between first formations of the *mineral* and those of the other *two kingdoms,* and, that it claims a sort of scientific property in the *former,* to which it does not lay equal pretension in the latter; but, as the distinction it intends is *unreal,* so its claim can never be *realised.* "*Man,*" it says, "who "has *weighed the planets* and *measured their dis-* "*tances, may presume to trace the operations by* "*which the surface of the globe has been arranged*[1]." What *analogy,* I beg leave to ask, can be found between the two cases; or, what *consequence* can possibly flow from the one to the other? What true comparison can be made, between the *measurement of present objects of sense* and the *recovery of past facts of history?* Because we can apply rules of arithmetic or mathematics to *present*

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[1] See above, p. 15.

objects, we are not *therefore* capacitated to recal *past events*. In the former case, we have the evidence of the truth *always with us*; in the latter, we must seek it *elsewhere*, for we can never find it in the *subject matter of our study*.

What then, it will be asked, is to become of that vast portion of the *mineral kingdom*, of which we would thus despoil the *Mineral Geology*?

It is to be restored to, and to be committed to the charge of *simple and genuine Mineralogy*; that sound and valuable science, to which pertains the cognisance of all the *mineral natures* of the globe, as that of the *animal natures* pertains to *zoology*, and that of the *vegetable* to *botany*. The zoologist does not " presume to trace" *the* MODE *of the formation or arrangement of the first animal individuals* by *secondary causes*, nor the botanist those of the *first vegetable*; they severally confine their attention to the characters and properties of the *individuals themselves*, which bound their vast and admirable sciences. In the same manner, the characters and properties of the *mineral individuals* bound the science of *mineralogy*; but yet leave it an equally wide and luxuriant field, for the exercise of its intelligence[1]. When it would adventure further, and would attempt to refer to *secondary chemical causes* for *the* MODE *of the first formations of those individuals*, it then deserts its sphere, and converts itself into *Mineral Geology:* a spurious and baseless science, which is so far from conducting us in the same course with Newton, that it leads us *quite the contrary way*. Newton's course leads *upwards*, to an open and unimpeded issue; at the *exit* of which, we perceive the *dawnings of a light that assures us we are near the sources of* DIVINE TRUTH. That of the mineral geology, on the contrary, conducts us *downwards* to an *obscurity;* in which we are presently stopped by a *bivium*, leading on the one hand, to *a chaos of aqueous solution*, and on the other, to *a chaos of igneous fusion*. Here we might long hesitate, which path to pursue; and, little would it matter which of the two we take at last, if we are determined to proceed in that descending direction; for, as both are equally remote from the *exit to truth*, whichever is most pleasing to the palate of the fancy, will yield the greater gratification;

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[1] " *Mineralogy*," says M. D'Aubuisson, " is that part of Natural History " which aims at a *complete knowledge of minerals*. In these, it may con- " sider, 1. the properties or characters by which they *strike our senses*, and " by means of which we *distinguish them from each other*: 2. that which " constitutes the *essence* of each of them, that is to say, their *chemical com-* " *position*:" by which we are only to understand, *the results they yield to chemical analysis*: " 3. the circumstances of their *position*, and the part they " bear in the constitution of the globe. Hence the *three* essential branches

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" of *Mineralogy*, to which Werner gives the names of *oryctognosy*, *chemi-*
" *cal mineralogy*, and *geognosy*. We may further inquire concerning
" *minerals;* the regions in which they are found, the portions of the earth
" which they constitute, and the uses to which they are employed by man,
" together with the means of adapting them to those uses: from hence,
" *geographical mineralogy*, and *economical* or *technological mineralogy*.
" Werner finally closes the various objects of which the knowledge is to
" be acquired in the mineral kingdom, by the *literary history of mineralogy*
" *and of the different metals*, and the *art of chusing specimens of minerals*,
" *and arranging them in collections*." (Tom. i. p. 376.) This, is the proper
sphere of *Mineralogy;* but, it can never generate *Geology*.

and, all that can be obtained in either of them, is the *gratification of the fancy*, or the *play of invention*. The *neptunian* and *plutonian* geologies may here securely contend, in ceaseless equality, for the truth of their respective *alchymical systems;* for, both being *equally false in principle*, neither can ever become *vanquished by the other*.

But, can we seriously contemplate this interminable contest to dogmatise concerning the *first* formations of this globe by *secondary* agencies, without hearing the " VOICE *which spoke out of the* " *whirlwind, and said: Who is this that* DARKENETH COUNSEL BY WORDS WITHOUT KNOWLEDGE? *Gird up thy loins like a man; for I will* " *demand of Thee, and answer Thou* ME. *Where* " *wast Thou when I laid the foundations of the* " *earth? Declare, if Thou hast understanding.*— " *Whereupon are the foundations thereof fastened?* " *or,* WHO *laid the corner-stone thereof?—Knowest* " *Thou it, because Thou wast then born? or, because* " *the number of Thy days is great*[1]*?*"

Whereas, if we will take the contrary direction and *ascend* with Newton; we shall make the nearest approach that the light of unaided reason can make, to the TRUTH *of the* MODE *of first formations in all the* THREE *kingdoms of terrestrial matter:* as will be fully demonstrated in the NEXT PART.

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[1] Job, xxxviii. 1.

END OF PART I.

PART II.

OF THE MODE OF THE FIRST FORMATIONS OF THE EARTH, ACCORDING TO THE MOSAICAL GEOLOGY.

A

COMPARATIVE ESTIMATE, &c.

PART II.

OF THE MODE OF THE FIRST FORMATIONS OF THE EARTH, ACCORDING TO THE MOSAICAL GEOLOGY.

CHAPTER I.

It has been sufficiently shewn in the preceding Part, that the *root* or *chaotic principle* of the Mineral Geology cannot endure the *test* of the reformed philosophy of Newton to which it appealed. It will hardly expect, that we should enter into any argument to *prove that Newton is right;* before we infer absolutely, from that failure, that *its own conclusions are wrong.* Since it has admitted the authority of his philosophy as a *test,* it must abide by its decision; and the reader will have seen enough in the foregoing discussion to convince him, of the just title which that authority possesses to decide the question at issue; viz. *the* MODE, *by which* ALL *first formations of this globe were really produced.* He will be sensible, that the *highest probability* to which the energies of unassisted reason can attain in this question, is to be found in that philosophy; and therefore, that it cannot exist at the same time in the *opposite* philosophy, which it contradicts, refutes, and reprobates. The *conclusions* of the mineral geology upon *this point,* are therefore in *direct opposition to the highest probability;* and therefore, to say the least, they must be in the *highest degree improbable.*

Valuable, however, as the *highest probability* is, when the *certainty of truth* cannot be attained; yet, when the mind has once ascended to that eminence of *secondary evidence,* it experiences an eager yearning to *advance still higher,* in consequence of the innate *appetite for truth* which characterises the intellect of man. Let us then inquire, whether this *final gratification* is absolutely withheld from us; or, whether we may not be able to add to the sentiment of the *highest probability,* the consummation of *positive certainty on this great question.*

That this can only be supplied by *competent and positive history,* and that *physical induction* is utterly incompetent to impart it, is a truth felt, and indirectly avowed, by the *mineral geology itself.* "Before we proceed to determine *causes,* (says "the ingenuous M. D'Aubuisson,) let us endea- "vour to make ourselves acquainted with their "*effects.* All the circumstances of the division of "mineral masses into beds and strata, as well as "the presence of these both in their *primitive* "and *actual* state, are yet *far from being known to* "*us;* and we are constrained to say, in closing "the subject, that the determination of stratification, its circumstances, and laws, remain still *a* "*problem to be solved;* and it is perhaps the most "important of geognosy.—We should have nothing more now to do, than to compose an "*history of the revolutions which have taken place* "*in the terrestrial globe during the formation of its* "*mineral crust;* but that *those revolutions are of an* "*order which has nothing analogous to the effects,* "*which we see Nature produce. The thread of* "*induction is cut off*[1], *it can no longer conduct us:* "*to attempt to advance without its aid, would be* "*voluntarily to lose ourselves in pure hypothesis.* "Nevertheless (he adds), *to fill up the void,* as far "as we are permitted, and to shew what *observation seems to indicate as most probable, and most* "*simple,* I shall summarily expose the manner in "which Werner represents the *changes which progressively took place in the formation of the mineral strata*[2]." He then lays down the *principle* constituting the *root* of this geology, which we have just tried by the criterion of Newton; viz. "*that the earth was heretofore covered by a vast* "CHAOTIC OCEAN *very different from our actual* "*seas, and containing the elements of the primitive* "*earth*[1]."

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[1] So also M. Cuvier: "Unfortunately, in physical history, the "*thread of operations is broken;* the march of nature is changed, and "*none* of the agents which she *now employs,* would have *sufficed for the* "*production of her ancient operations.*" (*Disc. Prélim.* p. 13.—*Th.* § 8.)

[2] Tom. i. p. 353.

The prudence and judgment of this estimable writer are not so conspicuous in the conclusion of this passage, as his ingenuousness is in the former part. He first declares, that a *void* exists in the *physical* means of recording an *history of the revolutions of the globe,* occasioned by the *thread of induction being cut off,* and, that to attempt to advance without its guidance, is to plunge ourselves into *pure hypothesis;* and yet, he immediately proceeds to fill up that *void* with *pure hypothesis,* as if the *presence of fiction* is always a more desirable thing than the *absence of truth:* a principle, which has been the fruitful source of the most dangerous errors. But, how comes there to be *any void at all?* The truth is, that the mineral geology has *created the void* at which it repines, by *rejecting the history* which had filled it; and it is the place of *the history so rejected,* that it fills up with the *hypothesis* which we have confuted by the authority of NEWTON, whose "*thread* "*of induction*" has *not been* "*cut off,*" but, on the contrary, has conducted us to the measure of the *highest probability,* and therefore, to the *verge of*

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[1] M. D'AUBUISSON, tom. i. p. 355.

that certainty which can only be supplied by *competent and positive history.*

It is amusing, to observe the confidence with which the mineral geology offers to *contrive an history* that shall supply that *void,* as if we were left totally without one: "*The ancient history* "*of the globe,*" it remarks, "is in itself one of the "most curious subjects that can fix the attention "of enlightened men; and, if they take any "interest in pursuing, in the infancy of our "species, the almost obliterated traces of so "many *nations* which have become extinct, they "will, no doubt, take a similar interest in tracing "back, amidst *the obscurity which covers the in-*"*fancy of the globe, vestiges of revolutions which* "*took place anterior to the history of all nations.* "We admire the power by which the human "mind has measured the motions of globes, which "*nature* seemed to have placed for ever beyond "our apprehension: genius and science have over-"leaped the bounds of *space;* and a few observa-"tions, developed by reasoning, have unveiled "the mechanism of the world. Would there not "also be *some glory* for man to overleap the "bounds of *time,* and, by means of a *few observa-*"*tions—au moyen de quelques observations*—to "*recover the history of this world, and the series of* "*events which preceded the birth of the human race?* "—to *restore the history of the thousands of years* "*which preceded the existence of man,* and of "thousands of beings which were never his contemporaries[1]?"

It is totally needless to inquire, what degree of *glory* might attend the success of this heroic effort; because, we are perfectly certain that the effort *could never be successful.* Imagination might be satisfied, and enthusiasm might be gratified, by the schemes of apparent concinnity which those efforts might produce; but, stern *reason,* which only looks to *truth* and *evidence,* sees beforehand, that *physical induction* can never produce "*a true history of the series of events which preceded the birth of the human race.*" How is it possible, that such a genius should blind its intellect against so plain and obvious a truth! The *certainty of history,* must be derived from a source very different in its nature from *physical speculation* or *induction.*

"The human mind (it is said) has a natural "*tendency to explore* what has passed in distant "ages, in scenes with which it is familiar; hence "the taste for national and local antiquities. "*Geology,* gratifies a larger taste of this kind; "it *inquires into* what may appropriately be "termed, the *Antiquities of the globe itself;* and "*collects, and deciphers,* what may be considered as "the *monuments* and *medals* of its remoter eras[2]." But, what could we make of *monuments* and *medals,* if it were not for the *auxiliary references of*

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[1] CUVIER, *Disc. Prél.* p. 2 and 140.—*Th.* § 1 and the end of § 34.

[2] *Vindic. Geol.* p. 6.

history? The mineral geology has indeed a strong *tendency* to explore, inquire, and collect these relics of the globe's antiquity, in rich abundance; but, to *decipher them when collected,* far exceeds the bounds of its capacity, unless it associates to itself *another and a more authoritative geology.* It was wisely observed by Mr. Kirwan; that "*past* "*geological facts* being of an *historical nature,* all "attempts to deduce a complete knowledge of "them *merely from their still subsisting conse*-"*quences,* to the exclusion of unexceptionable "*testimony,* must be deemed as absurd, as that "of deducing the history of Ancient Rome solely "from the *medals* or other *monuments of antiquity* "it still exhibits, or the scattered ruins of its "empire, to the *exclusion of a Livy, a Sallust, or a* "*Tacitus*[1]."

To add the consummation of *certainty* to the highest probability respecting the *first formation* and *revolutions,* that is, the "ANTIQUITIES" of this globe, is the exclusive pretension of the *Mosaical Geology;* and we are now to try the *root* or *fundamental principle* of this geology, by the same *test* we employed for trying the *root* or *fundamental principle* of the *Mineral Geology.*

It is evident to reason, that *certainty concerning a past fact,*—such as is, the *mode* by which all material existences were *really first formed,* or were *really afterwards altered*—must be *historical*

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[1] KIRWAN, p. 5.

certainty: the subject, therefore, is no longer a subject for *philosophical* or *scientific induction,* but for *historical evidence;* and, like all other subjects for *evidence,* it demands *a voucher competent to establish its truth.* Now, the *voucher* that could establish the *fact* respecting the *true mode of first formations,* must have been a *witness of that mode;* but, the *only witness* of the *mode of first formations* or *creations,* was the *Creator Himself.*

But, how may we presume to hope; that we can obtain the *positive testimony* of that awful *Actor,* and sole *Witness,* of the operation of *First Formation* or *Creation,* from whom *alone* we can derive the consummation of *positive certainty?*

As NEWTON has conducted us to the eminence of the highest probability, and therefore to the verge of certainty, so BACON, to whom the *mineral geology* equally appeals, shall be our guide to lead us on to that *sacred testimony* in which alone the evidence of *certainty* can subsist; for, the *foundation-stone* which he laid for that system of science which produced "*the happy* "*revolution effected by himself, and afterwards by* "NEWTON, *in the studies of the natural sciences,*" was no other than this:

"Let us FIRST seek for the *dignity of science* "in its ARCHETYPE, or EXEMPLAR; that is, in "*the attributes and acts of* GOD, so far as they are "*revealed to man,* and may be discreetly investigated by him. In which inquiry, we are not "to speak of *doctrine,* since all doctrine is *acquired* "*knowledge;* but no knowledge in GOD is ac-"quired, but *original.* We must therefore seek "another name; that of 'WISDOM,' *by which* "*name the sacred Scriptures denominate it.*"

It is evident that Bacon here particularly adverts to that article of those sacred Scriptures, in which "WISDOM" is sublimely personified, as having been present with, and attendant on the Creator, at the *first formation* of his creation.

"The Lord by WISDOM hath *founded the earth,* "by INTELLIGENCE hath He established the "heavens.—Doth not WISDOM cry, and INTEL-"LIGENCE put forth her voice, saying: 'The 'Lord possessed Me in the beginning of His way, 'before His works of old. I was set up from 'everlasting, from the beginning, *before ever* THE 'EARTH *was.* When there was no depths I was 'brought forth; when there were no fountains 'abounding with water. Before the *mountains* 'were settled, before the *hills,* was I brought 'forth: while as yet He *had not made* THE EARTH, 'neither the *plains,* nor the *heights of the dust of* '*the world.* When He prepared the heavens, I 'was there; when He set a *compass upon the face* '*of the depth:* when He established the clouds 'above: when He *strengthened the* FOUNTAINS OF 'THE DEEP: when He *gave to* THE SEA *His* '*decree, that the waters should not pass His com-*'*mandment:* when He *appointed the* FOUNDATIONS '*of* THE EARTH. Then I was by him as one 'brought up with Him; and I was daily His 'delight, rejoicing always before Him. Rejoicing 'also in the inhabited part of His earth, My de-'lights were with the sons of men. Now there-'fore hearken unto me, O ye children: for, 'blessed are they that keep My ways. *Hear my 'instruction, and be wise, and refuse it not*[1]*!*'"

It is this "WISDOM," vouchsafed to man as a positive and competent *voucher* of *the* MODE *of the first formation of this earth,* that Bacon here propounds; and upon the authority of whose testimony, he thus proceeds:

"'Thus, then, *the* FACT *stands:* In the works " of the *Creation,* we behold a *twofold* emanation " of the divine virtue; of which the one relates " to its *power,* the other to its *wisdom.* The former, " is especially observed, in the *creating* the ma-" terial mass; the latter, in the *disposing the " beauty of its form.* This being established, it is " to be remarked, *that there is nothing in the ' History of the Creation,' to invalidate the* FACT, " *that the mass and substance of heaven and earth " was created — confusa*[2] *— undistinguishable, in* " ONE MOMENT *of time; but that* SIX DAYS *were " assigned for disposing and adjusting it:* in so " signal a manner did God distinguish, between " the works of His *Power,* and of His *Wisdom.* " We may further observe; that in the *creation*

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[1] Prov. iii. 19; viii. 1, 22—33.

[2] See after, ch. iii.

"*of matter*, it is not related, '*God said, Let the* '*heaven and the earth be,*' as it is related of His "other works which ensued; but, simply and "actually, '*God created the heaven and the earth:*' "so that the *matter itself* seems to have been, "as it were, *a work of hand;* but the intro-"duction of its *form*, bears the style of a *law* or a "*decree*[1]."

BACON here appeals to a "*Revealed History* "*of the Creation*," the authority of which his judgment entirely acknowledged, and the statements of which he employed for the *foundation of his new philosophy;* a *document*, which we should therefore have expected to obtain equal authority with all those, who endeavour to gain confidence to their own doctrines by making profession of conforming to his. This "*Revealed History*," is no other than the *record* which was imparted to man by GOD, (the only possible *voucher* for the *fact of creation*,) through the ministry of MOSES; the authority of which record is acknowledged, with equal homage of the *reason*, by NEWTON, and supplies the *last degree of evidence* that remained, to perfect that of the highest probability deduced by NEWTON from a general analysis of the universe.

This sacred and inestimable *record*, which was revealed to mankind above 3000 years ago, unfolds a detailed recital—1. of the *mode* by which

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[1] BACON *de Augment. Scient.* lib. i. p. 37, vol. iv.

God at the first "*formed, and set in order*" *the entire system of this terrestrial globe;* and 2. of the *mode* by which He *caused it to sustain an universal revolution*, 1656 *years after He first formed it.*

A record of such amazing authority, ought in common reason to direct, and altogether to govern the intelligence, in all researches concerning *first formations* and *subsequent revolutions* of the earth; for, in proportion as we should depart from such a guide, we must necessarily depart from the *only rule* which can be able to establish *certainty* upon those subjects. This *record* contains, and supplies, the *root* or *fundamental principles* of *the* MOSAICAL GEOLOGY. We shall therefore proceed to investigate the great and important *facts* imparted in this sacred *Geological History;* applying them to the same *test* to which we before applied the alleged facts of the *Mineral Geology*, and keeping constantly in our view, both the *general conclusion* of Newton respecting the *mode of first formations*, and also the *corollaries* which we have been led to deduce from that conclusion. But, in pursuing that comparison, we shall be careful to adhere closely to the *principles* which they disclose; observing rigidly the admonition of Newton which enjoins, "*to admit no objections against them,* "*but such as are taken from certain truths*" plainly and unequivocally competent to disprove them.

The *conclusion of Newton,* was this:

I. That GOD, *in the beginning, formed all material things of such sizes and figures, and with* *such other properties, and in such proportion to space, as most conduced to the end for which He formed them; and, that He variously associated them, and set them in order, in His* FIRST CREATION, *by the counsels of His own Intelligence;* antecedently to the commencement of all *secondary* causes, or laws, which, *though they might continue the first formations, could not possibly have any share in producing them.*

The *corollaries which resulted from that conclusion,* were these:

1. That, in the *first formations* of all material things, God *anticipated,* by an immediate and incomprehensible act of His power, *sensible effects,* which were thenceforward to be produced only by *gradual processes,* of which He then established the laws.

2. That the *sensible phenomena alone* of the *first formations* of material things, whether *animal, vegetable,* or *mineral,* could not therefore determine any thing at all concerning *the mode* of their formation; because, the *mode* by which they were *actually first formed,* must have been *in direct contradiction to all apparent indications of their phenomena.*

“ *That the things which are seen, were not made* “ *of things which do appear*”—μη εκ ΦΑΙΝΟΜΕΝΩΝ τα βλεπομενα γεγονεναι, but, “ *that they* “ *were formed by the Word of* God—*of* Him, *who* “ *calleth those things which are not as though they* "*were*"—*κατηρτισθαι ρηματι Θεου*[1]—*του καλουντος τα μη οντα ὡς οντα*[2]; is, therefore, not only the first principle of *faith*, but the first principle also of *philosophy;* of that *reformed philosophy*, which was effected by BACON and NEWTON. And thus, in this *first great principle*, both *true philosophy* and *religious faith* are found *identified*.

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[1] Heb. xi. 3.

[2] Rom. iv. 17.

CHAPTER II.

IN entering upon a minute examination of the *text* of this Sacred Record, in order to obtain a true and precise apprehension of its contents, it is indispensably necessary, first of all, that we should inform ourselves, correctly, of its *general nature* and *true character*; by exercising the most scrupulous caution and circumspection, and by diligently employing those means of interpretation, which the resources of *sound learning* and *sound criticism* are alone able to supply.

With respect to the general nature and character of the record, methods of exposition have been devised, diversified, and applied, in all the variety which the subject matter could suggest to vivacity of imagination and ingenuity of conjecture: " *tam varias* (as has been truly remarked), " *et multa ex parte ineptas, ut qui omnes considera-* " *verit, et inter se comparaverit, multo sit incertior* " *quam antea fuit*[1]—so various, and in a great " proportion so absurd, that whoever considers " them all, and compares them all together, will " be in greater perplexity than he was before."

It was judiciously observed by an early ecclesiastical writer, " that the *scope* or *main object* of

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[1] ROSENMULLER, Sen. *Antiquiss. Tell. Hist.* p. 7.

" Moses in his history of the Creation, was not to " *instruct mankind in physics or in astronomy*, but, " to bring them to, and establish them in, the *know-* " *ledge of* GOD[1]." Yet, as that *knowledge* was ordained to embrace a knowledge of the *works* and *proceedings* of God therein revealed; the same writer further points out to our attention, with equal judgment, " *that the Mosaical history of the cos-* " *mogony entirely harmonises with the phenomena*[2]." Although, therefore, we are not to look for *physical science* technically so called, or for a *system of physics*, in the history, it is nevertheless manifest, that it behoves us to endeavour to *trace the harmony* subsisting between the *physical facts which are there declared or intimated*, and the *physical phenomena which are apparent in the globe;* from the investigation of which *harmony*, by the light of sound philosophy, we shall be able to deduce, and establish, a true *Mosaical Geology*. It would argue a very great obtuseness of intellect, not to be able to discern the difference between *physical facts* and *a system of physics;* the *former* of which, though not the *latter*, are included in the Mosaical history, and they therefore challenge our first attention, in considering the *history of the Earth* or the *foundations of Geology*.

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[1] ὅτι σκοπος ην τῳ Μωσει, ουτε φυσιολογησαι ουτε αστρονομησαι· αλλ' εις θεογνωσιαν και επι της κοσμογονιας ανθρωπους αγαγειν και παραστησαι. IOH. PHILOPONUS, εις την ἑξαημερον. Ap. PHOTII BIBLIOTH. ccxl. p. 991.

[2] συμφωνον ΤΟΙΣ ΦΑΙΝΟΜΕΝΟΙΣ την του θεσπεσιου Μωσεως κοσμογενειαν. Ib.

No expositor has so simply, so briefly, and yet so critically pointed out the rules for the true interpretation of the record, as the author of the first of these remarks, the learned D. I. G. Rosenmuller, in his little tract entitled "*Antiquissima* "*Telluris Historia*;" which rules are incorporated by his learned son, E. F. C. Rosenmuller, into his "*Scholia in Genesin, cap.* 1." Although this venerable expositor has been incautiously drawn, by the imposing countenance of *mineral geologists* —"*metallicarum rerum periti*,"—into some concessions militating in certain particulars against the plain import of the record, yet, the *principles* of his interpretation are so sound and true, that they supply the means of rectifying even his own aberrations in this respect; which aberrations, however, are not greater than those of our own learned commentator, Bishop Patrick, who has in a similar manner been seduced, by the same insufficient cause, into concessions injurious to the truth, because contrary to the import, of the record.

"All ingenuous and unprejudiced persons, "(says the learned German,) will grant me this "position: that there is no method for removing "difficulties more secure than that of an *accurate* "*interpretation*, derived from the *words of the text* "*themselves* and from their *true and legitimate meaning*, and depending upon *no hypothesis*. Being "impressed with this truth, and having repeatedly "perused the text with a view to this principle; "I now submit the interpretation which appears

" to me to correspond the best, both to the *signification of the words,* and to the *nature of the subject to be explained*[1]." The rules which constitute the *canons* of this interpretation, are these two:

1. That " *the style of the first chapter, as of the whole book of Genesis, is strictly* HISTORICAL; " *and that it betrays no vestige whatever of allegorical or figurative description:—stylum hujus capitis, quemadmodum totius Geneseos, esse* HISTORICUM; *nec allegoriæ vestigium ullum apparere*[2]*:* the truth of which proposition, (he " justly adds), must be so manifest to any one " who reads *with attention,* that it can need no " proof—*id cuivis attentè legenti ita clarum esse debet, ut probatione non egeat*[3]." This position, is alleged against certain loose and visionary critics, who were more inclined to study the indulgence of their *fancies,* than to exercise the labour of their *judgments* on points which their reason did not instantly apprehend.

2. That, " *since this history was adapted to the comprehension of the commonest capacity, Moses speaks according to* OPTICAL, *not* PHYSICAL " *truth:—quia tota hæc historia captui vulgi est accommodata, loquitur Moses ex veritate* OPTICA, " *non* PHYSICA[4]:" that is, he describes the *effects* of creation *optically,* or, *as they would have*

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[1] ROSENMULLER, Sen. p. 7. [2] Id. p. 8. [3] Id. p. 9.

[4] Id. Sen. p. 13 and 63; and Jun. p. 14.

appeared to the eye[1]; and without any assignment of *physical causes*. In doing which, he has not merely accommodated his narrative to the apprehension of mankind in an infant state of society, and employed a method of recital best suited to a vulgar capacity; but, he thereby also satisfies an important requisition of experimental philosophy; viz. *to describe effects accurately, according to their sensible appearances*: by which means, the mind is enabled to receive a *clear and distinct impression of those appearances*, and thus to *reduce them to their proper causes*, and to draw from them *such conclusions as they are qualified to yield.* For, as the mineral geology has justly remarked in the passage quoted in the preceding chapter from M. D'Aubuisson; "the determination of *causes*, must *fol-"low our acquaintance with their effects.*"—"From "the oversight of which principle, (as the learned "German expositor has truly observed,) a great "part of interpreters have wandered so far into "error, as to *imagine they have detected the* SYSTEMS "*of modern physics in the recital of Moses; and have "perverted and tortured his language, into an adapta-"tion to their own preconceived opinions*[2]."

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[1] "The sacred historian (observes also Bishop Horsley) describes the "progress of the work by the *phænomena*, such as they would have suc-"cessively appeared to *a spectator*, had a spectator been in existence. "Or, we may say, he describes the work in its different stages to a "*supposed spectator*."—*Biblical Criticisms*, vol. i. p. 2. This method of description, is characteristic of the simplicity of primitive narration.

[2] ROSENMULLER, Sen. p. 14.

These *two canons of interpretation*, will thoroughly vindicate their validity in the following exposition; and will fully demonstrate, "*that* "*the first chapter of the record discloses an interpretation, in which the laws of physics and the* "*language of the Hebrew text, subsist in the closest* "*harmony:—quòd hoc caput interpretationem legibus physicis prorsus consentaneam, eandemque* "*verbis textûs Hebræi aptissimam, patitur*[1]."

The *Mineral Geology*, in order to preserve the perfect independence of its speculations in the remoteness of time, and to relieve itself from the restraint of perpetually submitting those speculations to a *standard of authority*, strives to establish the principles—that the Mosaical record "*treats only* "*of the history of Man;*" and, that it "*does not go* "*so far back into the history of the globe,*" as it is itself enabled to do by the acuteness of its scientific penetration. How far it is supported in these very hazardous assertions, and in this exalted pretension, will be rendered thoroughly apparent in the progress of our examination of that record.

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[1] ROSENMULLER, Jun. p. 8.

CHAPTER III.

ACCORDING to the method of recital exposed in the preceding chapter, the historian thus delivers the *First Article* of his sacred history:

> " *In the* BEGINNING, GOD *created the* HEAVEN *and the* EARTH.
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> " BUT, *the* EARTH *was* INVISIBLE, *and* UNFURNISHED, *and* DARKNESS *was upon the face of the deep:* THEREFORE *the Spirit of God went forth upon the face of the waters, and God said,* LET THERE BE LIGHT! *and there* WAS LIGHT!
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> " *And God saw the light, that it was good; and God divided the light from the darkness; and God called the light* DAY, *and the darkness He called* NIGHT.
>
> " *And the evening and the morning were the* FIRST DAY."

Such was the *primitive interpretation* of this great opening article of the Record; which uniformly maintained its authority, not only throughout the ages of the ancient Hebrew church, but also, during the first and most learned ages of the Christian. In considering this first article, and others of the following articles of the history, it will be advisable that we should proceed, 1. by establishing the *interpretation* of the passage; 2. by deducing its *true import;* and 3. by considering the *particular errors* which have resulted from a defective interpretation of the text.

And I. 1. This sublime article, immediately presents to our attention a very important *grammatical* and *critical* question; which appears to have been entirely overlooked by all modern commentators, but on which nevertheless, as will presently be seen, the *correct interpretation of the context* essentially depends. This question, regards the true signification of the Hebrew conjunction ו, *vau,* at the *beginning of the second clause;* which particle is employed no less than *fourteen times,* in the original of this first article.

This *conjunction,* to which the elder Michaelis assigns *thirty-seven* different significations, and Noldius upwards of *seventy,* is a particle which discharges in the Hebrew language the functions of *all* the conjunctions, both *copulative* and *disjunctive;* its sense being determinable, in each particular case, only by the relation of the context, and the practice and genius of the language. On which account it has been acutely remarked, that "since *we* are not exercised, as the *Hebrews* were, "*immediately to adapt our thoughts, upon the occurrence of this simple particle, to the different* "*respects which the discourse requires;* he who "should *always* interpret ו by *et, and,* would not "place *us* in the same position with the *Hebrews;* "for, *we* need a further guidance to fix its actual "significations, which *they* did not need[1]." Now, almost all the modern versions have uniformly rendered that particle, in this place, by the *copulative* conjunction *et — and,* in all the *fourteen* places where it occurs. Hence it is, that our English version renders it: "God created the "heaven *and* the earth; *and* the earth was with- "out form," &c.

But, if we look to the *most ancient Hebrews,* who were well exercised in, and familiarly conversant with, all the peculiarities of their own native language; we shall find, that they *all* interpreted it by the *disjunctive* particle, *but;* none of them, by the *copulative, and.* Thus it was rendered by the *first interpreters of the text,* the Jews of Alexandria, nearly three hundred years before the Christian era: *εν αρχη εποιησεν ὁ ϑεος τον ουρανον και την γην· ἡ* ΔΕ *γη ην αορατος,* &c.—"In the be- "ginning God created the heaven and the earth:

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[1] — "Præfixum ו, procul dubio ex וו, quod in Exodo frequens instru- "mentum est *aliquid alteri jungens,* est desumtum. (BUXTORF, MI- "CHAELIS, CASTELL.) — Digna sunt de vero præfixæ literæ usu verba "GUSSETII quæ hic ex *Comment. Ling. Ebr.* 218. legantur:— 'ו copulativa, inquit, varias significationes habere traditur, quia et eæ 'augentur pene in infinitum; quo vel solo refutatur illa sententia. Di- 'cendum potius fuit, ו *grammatice* nihil magis *per se* significare quam 'ET; Ebræosque audientes ו eo tantum moneri conjungenda esse se- 'quentia cum præcedentibus, at modo conjunctionis eorum non de- 'signato. Modus autem ille quisnam esset, intelligi debuit *ex serie ser- 'monis, rerumque antecedentium et posteriorum naturis ac relatione ad se 'invicem,* quatenus eæ *aliunde* quam ab hac particula ו innotuerant; ita 'ut qui ו aliter quam per ET exponit, suam interpretationem probare 'debeat.—Quapropter particulæ hujus varios usus tradere non est *gram-*

" *but*, the earth was *invisible*," &c. In the same sense it was apprehended by the learned Jew, Josephus, who thus paraphrased the passage: *εν αρχῃ εκτισεν ὁ Θεος τον ουρανον και την γην· ταυτης* ΔΕ *ὑπ’ οψιν ουκ ερχομενης, αλλα βαθει μεν κρυπτομενης σκοτει*, &c.[1] " In the beginning God created " the heaven and the earth; *but*, the latter *not* " *coming into view*, but being *hidden in profound* " *darkness*," &c. In the same manner we find it in the Chaldee paraphrase; which, in the Latin, is rendered thus: " In principio creavit Deus " cœlum et terram: terra *autem* erat," &c. The *old* Latin version renders the conjunction in the same manner: " Terra *autem*, &c.;" and so likewise does the *Vulgate*, translated by St. Jerom on the Hebrew original, with the aid of the most learned Rabbin of his time. And of modern commentators, the eminently learned Vatablus, Dru-

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' *matici Ebraici*, sed ad *rhetoricam* artem potius spectat. Traduntur ergo ' illi usus per accidens tantum, et respectu quodam externo, nempe in ' ordine ad alias linguas, et ad interpretes juvandos, ut pro ו eam parti- ' culam substituant, quam quis lingua ista extera sermonem faciens tali ' loco positurus fuisset. Cumque hoc pacto simplicimæ vi conjunctivæ ' ipsius ו aliqua alia notio superaddatur, agnoscendum est non sic *meram* ' *versionem* fieri, sed *paraphrasin* veluti aut *commentarium compendiosum*. ' Id tamen facere necessarium, quia versiones traduntur populis *non ita* ' *exercitatis, ac erant Ebræi ad inflectandam occurrente copulativa simplici* ' *cogitationem in eos respectus, quos requirit sermonis series. Itaque, qui* ' *redderet ubique* ו *simpliciter* ET, *nos non poneret in eodem statu quo erant* ' *Ebræi. Egentibus enim auxilio illud non dare, non idem est ac illud non* ' *dare non egentibus.*' Hæc GUSSETII optime." — *Not.* Tympii, *ad* Noldii *Concord. Partic. Heb.* p. 283.

[1] *Ant. Jud.* lib. i. cap. 1.

sius, Fagius, and Grotius, understand it with the sense of *autem*—*but*, as in the Vulgate; with which same signification, this particle occurs above *five hundred times* in the Hebrew Scriptures[1]. We thus learn, *how* it was understood in this particular place by those who knew how to connect it, "*ex serie sermonis, rerumque antecedentium et* "*posteriorum naturis, ac relatione ad se invicem.*" This, then, it is evident, was the interpretation collected by the *rule of the language* in the *ancient Jewish church.* And, it must be evident to every scholarly mind, that this particle, repeated *fourteen* times in this short paragraph, could not be limited each time to the unvarying sense which pertains to our English conjunction, *and;* or, even to the senses of the Latin *et*, and the Greek *και*, which have somewhat a wider latitude of signification. But, the truth is, that the Hebrew language did not possess, and therefore could not command, the *diversity of particles* which those languages enjoyed; and, therefore, it was constrained always to repeat the *same particle* ו, the proper *actual sense* of which was impressed in the mind of the auditor, or reader, by the purport of the discourse and the tendency of the argument[2].

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[1] NOLDIUS, p. 301.

[2] We meet with a notable illustration of the various powers and relations of the Hebrew particle ו, in a passage of St. Stephen's speech addressed to the Hebrews in Acts, vii. 4, 5; where the sacred Hellenistic reporter, adhering to the idiom of the original oration, renders it uniformly throughout by the Greek *και*.—ΚΑΙ

But, it is plain, that there must have been *some dialectical or critical reason* for this uniformity in *all the earliest interpretations*, of the sense, δε — *autem — but*, in this place. Now, the principle upon which the *disjunctive* sense was affixed to the particle in this place, and not the *copulative* which our version has adopted, will reveal itself on an attentive examination. The proposition — "*God created the heaven and the earth*, AND *the* "*earth was invisible;*" would seem to imply, that it was the design of God in its creation, *that it should be invisible.* Whereas, the proposition — "*God created the heaven and the earth;* BUT *the* "*earth was invisible*" — carries a contrary implication; and excites an expectation of that which immediately follows, namely, the *formation of light*, by means of which the *invisibility* of the earth was to be *remedied.* " God created the

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εκειθεν, μετα το αϖοθανειν τον ϖατερα αυτου, μεθῳκισεν αυτον εις την γην ταυτην εις ἡν ὑμεις νυν κατοικετε· KAI *ουκ εδωκεν αυτῳ κληρονομιαν εν αυτῃ, ουδε βημα ϖοδος·* KAI *επηγγειλατο αυτῳ δουναι εις κατασχεσιν αυτῳ,* KAI *τῳ σπερματι αυτου μετ' αυτον, ουκ οντος αυτῳ τεκνου.* i. e. " AND from " thence, after his father died, He removed him into this land wherein " ye now dwell; YET (*tamen* — NOLDIUS, p. 305.) He gave him no " allotment therein, not even a footstep: ALTHOUGH (*quamvis* — NOLD. " p. 296, 7.) He promised that He would give it to him for a possession: " THAT IS (*id est* — *nempe* — NOLD. p. 290, 293.) to his seed after him; " while he had as yet no child." If, in all these four clauses, *και* were to be uniformly rendered by *and*, " the series of the discourse, and the " natures and mutual relations of the antecedent and subsequent sen- " tences," would be equally destroyed as by uniformly rendering ו, *and*, in the first two verses of Genesis. The attentive reader, will find abundant occasions for applying the Hebrew rule to the Hellenistic *και*, in the Greek Testaments.

heaven and the earth: *but,* the earth was *invisible,* " and *darkness* was upon the face of the deep: " *therefore,* God said, *Let there be Light!*" The repetition of the conjunction ו, in this *last* clause, where it is also rendered by *and* in our version, gives it the proper force of *wherefore, therefore* — *quare, quamobrem, itaque*[1]; with which sense it occurs, in more than *two hundred and fifty places* in the Scriptures; and this force accrues *consequentially,* from the sense of δε, *but,* in the *preceding* clause. And thus, the *mutual relation and dependence of the three clauses* is clear and distinct, and *their connexion,* necessary and indissoluble. Josephus plainly shews by his paraphrase of the passage, that he understood the three clauses with this intimate relation and correspondence: εν αρχῃ εκτισεν ὁ Θεος τον ουρανον και την γην· ταυτης ΔΕ ὑπ᾽ οψιν ουκ ερχομενης, αλλα βαθει μεν κρυπτομενης σκοτει, ΠΝΕΥΜΑΤΟΣ ΔΕ αυτην ΕΠΙΘΕΟΝΤΟΣ, γενεσθαι φως εκελευσεν ὁ Θεος—" *In the beginning* " *God created the heaven and the earth;* BUT, *the* " *earth not coming into view, but being hidden in* " *profound darkness, the Spirit moreover coming* " *upon it, God commanded* LIGHT TO BE."

That we are to understand *but,* not *and,* at the beginning of the *second clause;* is, therefore confirmed, both by the authority of all the earliest interpreters, and by the natural import of the text critically ratifying that authority. This *intimate*

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[1] NOLDIUS, p. 297.

relation of the sentences, will be found a very essential point for the reader to hold in his recollection.

2. The criticisms which have been exercised upon the word ברא, *created,* are very trifling: viz. that it does not denote, *productio ex nihilo—production out of nothing;* but, *productio ejus quod antea non extitit—production of that which before did not exist.* It is difficult to discern the difference intended between the two; which, however, resolves itself into this, "that the former "notion was too metaphysical and abstract for "the apprehension of man in his primitive state[1]." But, this will not prevent the latter from signifying exactly the same thing as the former; which it must necessarily do, when it relates to the *production εν αρχῃ,* or *first production,* of a world which could not have existed before it was produced.

3. What the historian intends by the word ארץ—*earth,* in this first verse which declares its "*creation in the beginning;*" is distinctly explained in the tenth verse, in which he expressly tells us, that it signifies היבשה, ἡ ξηρα—the "*dry*" matter of the globe, contradistinguished from המים, τα ὑδατα—"*the waters*" which covered it and prevented it from appearing. He thus tells us, that the "*dry matter,*" which was *made to appear on the third day,* was the identical ארץ—

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[1] MICHAELIS, *Suppl. ad Lex. Heb.* ברא.

"*earth*" which was *created on the first day*; and he subjoins *two characters* which obviously pertained to its first formation so described—viz. that it was *tohu—invisible, va-bohu—and unfurnished.*

4. That celebrated phrase, תהו ובהו, *tohu vabohu*, on which fancy and system have so largely and so unsubstantially built, is *not of uncertain signification*, as has most inconsiderately and unwarrantably been assumed, or pretended; for, we find the *most ancient* interpretation of it, as delivered by the *native translators*, uniformly maintained both in the Jewish and Christian churches for above *six hundred years* after their time; which *prescription* constitutes as solid and secure an evidence of the *primitive signification* of the terms, as the most punctilious criticism, founded on *reason*, can require or desire in any language. Those words, which our version, conforming to *later* translators, has rendered, "*without form*, "*and void*;" are rendered by the *oldest* Jewish interpreters, (the LXX.) *αορατος, καὶ ακατασκευαστος*; *invisible or unapparent*, and *unfurnished or unprovided.* So also they were interpreted by the learned Jew, Philo[1]. And that Josephus, whom Jerom calls "*vir Hebræus, et ab infantiâ sacris* "*litteris eruditus*[2]—*a Hebrew, skilled in sacred* "*learning from his infancy*[3]," understood the first of

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[1] Tom. i. p. 5. ii. pp. 491, 610. [2] *Ep.* MAGNO, *Oratori Romano.*

[3] " Reliquis autem omnibus diligentius illustrandum *Josephum* mihi " sumpsi. Disputatum de illo, *Græcane an Hebraica* biblia legerit?

those words to signify *αορατος*, *invisible*, is manifest from his paraphrasing it, ὑπ' οψιν ουκ ἐρχομενη — *not coming into view*. So likewise the oldest Latin version renders the words. And Jerom avowedly regarded this as the *established interpretation*, so late as the close of the *fourth century*; for, in his commentary on the 40th chapter of Isaiah, he says: " In the beginning of Genesis, " where *it is written*, ' But the earth was *invisible* ' *and unfurnished;*' the *other* interpreters (i. e. the " *later;* sc. Aquila and Theodotion,) have trans- " lated, ' but the earth was *void and nothing*' — " In principio Geneseos, *ubi scriptum est*, ' terra ' autem erat *invisibilis et incomposita:*' *cæteri* " transtulerunt, ' terra autem erat *inane et nihil*[1].'" Those remarkable words of so early and learned a Father — " *ubi scriptum est*," as opposed to " *cæ-* " *teri*," prove incontestably; that the canonical interpretation of the words *tohu va-bohu*, remained unaltered in his age from that which was assigned to them in the earliest age to which we can recur. It is therefore very questionable, whether the *present reading* of the Vulgate in this place—" *inanis* " *et vacua*," is really that of Jerom. Tertullian,

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" *Utraque sane*, ut plane facere possum. Ii vero turpissime falluntur, " qui Hebraicæ linguæ peritiam ab eo abjudicant. Grammaticarum " legum imperitior (fateor) quod nondum grammatica linguæ mortuæ " inventa esset, *verborum significationes multo plures noverat, quam illi* " *ipsi, qui de eo judices sedere audent.*" — MICHAELIS, Pref. ad *Spicileg. Geogr. Heb. Ext. post* BOCHARTUM.

[1] For the origin of this later interpretation, see the conclusion of this chapter.

Hermogenes, Ambrose, and Augustin, employ the primitive interpretation, “ *invisibilis et incomposita;*” and Origen had observed in his *first Homily* on Genesis, of which we have only the Latin version of Rufinus: “ *invisibilis* et *incomposita* terra erat “ antequam Deus diceret, *fiat lux*, et antequam “ divideret inter lucem et tenebras, secundùm “ quod sermonis ordo declarat.”

When, therefore, we find this passage rendered by later writers with the sense of *confusus*, as in the passage above quoted from Bacon, we ought to understand it only with relation to *vision*, and not, (as the mineral geology would wish us to understand it,) with relation to *the subject itself;* as, *confusus*, *indistinctus*, and *obscurus*, are used indifferently with relation to *perception*. Thus, Statius designates a *covered* and *darkened* sky, “ *confusus Olympus*[1].” It is also certain, that where the same phrase occurs in Jeremiah[2], the character which accompanies it is *darkness:* “ I “ beheld the earth, and lo, it was *tohu va-bohu;* “ and the heavens, and they had *no light*.” The Septuagint text reads: “ I looked on the earth, “ and lo, *nothing!* ουθεν; and towards the heaven, “ and its *lights were not!*—και ουκ ην τα φωτα “ αυτου:” where it is manifest, that ουθεν—*nothing*, means, *nothing perceptible* or *visible*. So, where we read the menace upon Babylon; “ He shall “ stretch out upon it the line of *tohu*, and the “ stones of *bohu*[3];” the local testimony of its *efface-*

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[1] *Theb.* v. 421.   [2] Chap. iv. 23.   [3] Isaiah, xxxiv. 11.

ment from view, by accumulated soil and vegetation[1], corroborates the ancient interpretation of the passage in Genesis; that it intended to express *obscurity*, and *exclusion from sight*. All those *ancient* authorities, confirmed by the subject matter of the text, unite to give a *determining weight* to the primitive interpretation *αορατος*, *invisible*, above any other which modern oriental philology can maintain: "*terra enim verè invisibilis fuit, vora-*" "*gine aquarum obducta*[2]—*for, the earth was truly*" "*invisible, being hidden by the incumbent mass of*" "*waters.*" And, since the *surviving dialects* of Syria and Arabia possess no words of the same elements with *tohu* and *bohu* which signify *αορατος*, and *ακατασκευαστος*; it will be critical to apply to those two words, the judgment given by Michaelis upon the word משל: "soli linguæ Hebraicæ pro-" "prium, sed *antiquum*;—ergo, aut reliquis linguis" "orientalibus planè *periit*, aut, quod potius reor," "est *exoticum*, jam ante Mosen ex alia lingua," "non cognita, in Hebraicam invectum[3]." Theodoret thus explains the passage: "*αορατος*—*in-*" "*visible*, on account of the water which *covered*" "*it;* and *ακατασκευαστος* — *unfurnished*, because" "it was *unadorned* with herbs, or meadows, or" "groves, or fields." Again "*αορατος* —*invisible*," "because *darkness was over the abyss*[4]."

Invisible and unfurnished — imperceptible and

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[1] "*Travels in Ancient Babylonia*," by Sir R. K. PORTER, vol. ii. p. 336—402.

[2] ROSENMULLER, Jun. *in Genes.* p. 9.

[3] *Suppl. ad Lex. Heb.*

[4] *Quæst. in Genes.* v.

barren—are therefore the *only characters* under which the sacred historian represents the state of the globe at its *first formation.* In thus substantiating the *true meaning* of the words *tohu va-bohu,* we annihilate every support which a *chaotic geology* can hope to derive from the countenance of Scripture.

5. The "*spirit of God*"—רוח אלהים—*πνευμα Θεου,* has been expounded by some commentators, from the earliest ages of the Christian Church, to signify the *air* or *wind;* and by others, to denote the *divine person of the Holy Spirit.* "Some," says Theodoret, "think that it signifies the *All-holy* "*Spirit,* vivifying the nature of the waters—but "I think that the true interpretation is, that "Moses, by the word *spirit,* intended the *air*[1]." —"It is an *ambiguous* phrase," says Drusius: "for it signifies both *a wind,* and the *Holy* "*Spirit*[2]." It is strange, that a *third* interpretation did not prevent all ambiguity among the *Christian* commentators; since it was evidently that of the ancient *Jewish* church, in its purest state. It is plain, in the passage just quoted from Josephus, that the clause in which this phrase occurs was not taken separately, as a proposition by itself; but, in connexion with that which follows: "*The spirit of God went forth* "*upon the face of the waters, and God said:*" as where we read—"*he opened his mouth, and said:*—

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[1] *Quæst. in Genes.* viii.
[2] *Critici Sacri,* in loc.

"*he lifted up his voice, and said.*" The "*spirit of God,*" will thus signify the "*breath of the word of God,*" by the *effusion* of which He pronounced His mandate—"*Let there be light!*" So R. Salomon interpreted it: "*spiritum oris,* et *verbum* seu *mandatum*—the *breath of His mouth,* that is, His *word* or *mandate*[1]." Thus we read in the book of Job, "*by His* SPIRIT He *hath garnished the heavens*[2];" which phrase is thus expounded in the Psalms[3]; "*by the* WORD *of the Lord,* (or, *the* VOICE *of his word*[4]), *were the heavens made, and all the host of them by the* BREATH OF HIS MOUTH." This *paraphrase* of the Psalmist, gives *critical determination* to the passage of Genesis; for, the Hebrew word rendered *spirit* by our English translators in Job, and *breath* in the Psalms, is, in both places, the same identical word, רוח, which is employed by Moses in this passage; and, in each, it relates to "THE WORD," by which God pronounced the FIAT of creation. If, therefore, we consider this *anthropopathical* form of speech with a *doctrinal* reference, it will plainly respect the divine ΛΟΓΟΣ, δι' οὗ παντα εγενετο, και χωρις οὗ εγενετο ουδε ἓν ὃ γεγονεν—"THE WORD *by whom all things were made, and without whom was not any thing made that was made;*" and of whom we likewise read: ενεφυσησε και λεγει—"*He* BREATHED *and* SAID[5]."

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[1] *Crit. Sac.*

[2] Job, xxvi. 13.

[3] Psalm xxx. 6.

[4] Psalm ciii. 20.

[5] John, xx. 22.

6. The verb מרחפת, expressing the *action* of that *spirit* or *breath;* and which our version renders, "*moved* upon the face of the waters;" is interpreted by the Alexandrian Jews, επεφερετο—*bore itself*, or *was conveyed upon.* Michaelis renders it, *delapsus est, descendebat—went* or *came down.* The Chaldee paraphrase, gives it the sense of *insufflabat—blew upon.* In all these senses, it properly connects itself with the *action which immediately follows;* forming but one proposition—"*the* "SPIRIT OF BREATH *of* GOD *went forth upon the* "*face of the waters, and* GOD SAID," &c. This interpretation is undeniably more natural, more intelligible, more congenial to the Scriptural style, and more consonant to the recorded impressions of the early Scriptural writers; than either the action of a *violent wind*, before physical agents existed, or the *incubation* of the divine person of the *Holy Spirit*, which conveys no real sense to the mind.

7. The תהום, *deep* or *abyss*, covering the *whole globe*, is well observed by Rosenmuller to be the same as המים, *the waters*, mentioned in the next sentence; which, being afterwards *collected and confined in one place*, became thereby the ימים or SEA. For, the Greek αβυσσος, *abyss*, by which the Alexandrian Jews render the former word, only denotes the *unlimited extent* of the aqueous surface. Hesychius explains it, ὑδατα απειρα, ακαταληπτα, περας ουκ εχοντα—"*waters without* "*bound or limit.*"

8. For the true and genuine signification of the word יום, IOM, DAY, in the recital of the sacred historian, I must refer the reader to Note [I], " *On the Mosaic Days of Creation,*" subjoined to this volume; in which he will find ample and demonstrative proof, that it must be understood in its simple and ordinary sense, of the time of *twenty-four hours;* and, that it cannot be interpreted otherwise, unless by setting up arbitrary and illegitimate *invention* as a rule against the united testimonies of established language and sound philosophy. An *artificial perversion* of the true sense of the word, constitutes the *only obstacle* to a clear and ready apprehension of the important facts imparted in the record.

II. Having thus determined the interpretation of the *terms* of the article, let us next consider the *instruction* which it conveys to us.

In this first sublime and comprehensive article, embracing the " creation of the *heaven* and the " *earth,*" the sacred historian summarily comprises the history of the *first formation of the entire mineral substance constituting the solid body of this Globe;* produced " *at the beginning,*" (as Newton speaks) and " *in one moment of time,*" (as Bacon speaks) by the *mode* of " *creation;* and, with the " *size, figure, properties, and proportion to space,* " *which most conduced to* THE END *for which God* " *created it.*" We hear of no further operation, or process, respecting the *first formations* of the *mineral part of the globe;* in that creative moment "*His hands prepared the* DRY LAND," in perfect adaptation and subserviency to the final causes which, in *two days,* were to reveal themselves. It was created *entire* and *complete,* in its *substance, form, texture,* and *arrangement;* although it was enveloped by a *fluid* resting upon, and flowing over, every part of its *compacted surface,* which formed for a *very short time* the bed or bottom of an *universal sea.* There was no intermixture of that water with the particles composing the hard and solid body beneath, no *confusion of the two elements;* but, the *marine fluid* was totally distinct from the *terrene solid,* and did not continue long enough upon a considerable portion of it, to penetrate far into its internal substance. That *dry* and *solid body*—יבשה, *ἡ ξηρα,* was *concealed by the cloak of waters,* and *total darkness encompassed that cloak;* so that the spheroid, speaking *relatively* and *optically,* was *invisible* or *unapparent;* and, being as yet a mere mineral mass, it was *barren* of all external production, and was therefore *unfurnished* or *ungarnished.*

But it was the design of God, first, to render it *visible;* and next, to *furnish* it. He, therefore, first of all, commanded the existence of *light;* and immediately, *there was light!* At the same time, He *divided the light and the darkness;* that is, He established, and gave first operation to, the *laws of proportion and succession between the measures of the two;* and, having given *origin* and *action* to those laws, they accomplished, in their due course, the *First Day*.

In this brief, but pregnant description of *effects*, the historian records, by necessary implication, the history of *the commencement of* TIME, by the ordination of the *instrumental causes* which were to produce the first diurnal *measure* and *succession* of *darkness* and *light;* for *time*, as Philo truly remarks, signifies nothing else but "*the successive* "*distances of days and nights, effected by the motions* "*of the heavenly bodies:*" συμπας ὁ χρονος ἡμερων και νυκτων εστι διαστημα[1]:—διαστημα της του ουρανου κινησεως εστιν ὁ χρονος[2]. The historian relates, that God first produced the *effect of light;* which *effect* following the darkness, and these succeeding to each other from thenceforth in *regular diurnal alternations*, shew that *the instrumental causes* which were to *perpetuate the effect*, were then *first put in action*. As he describes *optically*, and solely with a view to the *practical* and *sensible* apprehension of the *facts* which he relates, his description is confined to *effects;* but, it is for the common knowledge and experience of his readers to refer those *familiar effects* to their *plain and obvious causes*. And so his ancient Hebrew readers failed not to refer them; who needed not that he should tell them, that the *light* of which he spoke proceeded from the same physical cause from which they knew that they derived their *daily light:* παν φως ἡμερας ενιαυτου αφ' ἡλιου—“ *the light of every* “ *day of the year is from the Sun*[1]*:*” and they accordingly understood, as *of course*, that it proceeded from the *Solar fountain of light*, though not expressly stated by their historian. Ignorance, on the one hand, and hypothesis and system on the other, have variously contrived to perplex or pervert this simple recital; but, sound learning, sound criticism, and sound philosophy, will receive and apprehend it according to the *simplicity of description* in which it is delivered. This subject we shall have occasion to examine more particularly, when we come to consider the historian's record of the *transactions of the fourth day of creation;* on which day, the *sun* and *moon* were first revealed in their *relative functions of* RULING *the day and the night.*

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[1] Tom. i. p. 44.

[2] Ib. p. 4.

The sublimity of the clause in which the *creation of light* is related by Moses, has long been a subject of critical remark and admiration; and, the more that amazing operation is contemplated, the more will the mind be affected by a sense of that sublimity. The recent enlargement of the sphere of our acquaintance with the *solar body*, obtained by the observations of the late Sir William Herschel, contributes greatly to augment the force of that sentiment, by the distinctness which it imparts to the conception. That illustrious astronomer discovered, that the *body* of the sun is an *opaque substance;* and, that the splendid matter which dispenses to the world *light* and *heat*, is a *luminous atmosphere*[1] attached to its surface, figuratively, though not physically, as *flame* is attached to the wick of a *lamp* or a *torch*. So that the *creation of the solar orb*, as a part of "*the* "*host of heaven*," does not necessarily imply, the *creation of light;* and, conversely, the *creation of light*, does not necessarily imply, the *creation of the solar orb:* and the same principle applies to all the sidereal fountains of light which embellish the heavens, and which we denominate the *fixed stars*. In the first creation of "*the heaven and the* "*earth*," therefore, not the *planetary orbs* only, but the *solar orb itself* was created *in darkness;* awaiting the *light*, which, by one simple divine operation, was to be communicated *at once to all*. When then the Almighty *Wŏrd*, in commanding the *existence of light*, commanded the *first illumination of the solar atmosphere*, its new light was immediately caught and reflected throughout space by all the members of the planetary system. And well may we imagine, (to speak by the animated figure of the inspired poet,) that in that first, sudden, and magnificent illumination of the universe, "*the morning stars sang together,* "*and the Sons of God shouted for joy*[2]*!*"

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[1] Ecclesiasticus, xxxiii. 7.

But, that great *cause of light*, though *physically co-existent* with its effect, was *optically non-existent* with relation to the earth covered by the waters;

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[1] *Phil. Trans. for* 1795, p. 46; *and for* 1801, p. 265. [2] Job, xxxviii. 7.

and, being at the same time the *cause of heat*, this new power, exercised upon the universal aqueous surface, necessarily exhaled an universal vapour enveloping the whole globe, through which the light transmitted subsisted only in its *effect;* and thus, light, without a manifested cause, was diffused over the globular surface, in the mode which we ourselves experience during the prevalence of *dense fogs.* Nevertheless, the *effects* of *light* and of the *alternation of darkness and light* recorded by the historian, carry with them, virtually, the record also of the proper *physical causes* which were ordained to produce them; and they instruct us, that in this *first day* of creation, both the solar fountain of light was opened in the heavens, and this globe received its first impulse of rotation, on its axis and in its orbit. And, since we perceive, by the *intimate connexion, mutual dependence, and necessary sequence of the clauses of this article,* which have been shewn, that all these great transactions were included within that *first day* or *first entire revolution of the new globe;* we perceive also, that *time,* which only exists by relation to that revolution, *began with the creation of the globe* and *the commencement of its revolution in darkness;* and, that the creation of *light* succeeded, at that *proportion of distance in time* which was thenceforth to constitute the *perpetual diurnal divisions of the two.* So that darkness, in its *relative* character of *night*, commenced at the moment that the earth *was created and* *revolved;* and *day* commenced, at the moment when light succeeded at the *distance ordained for their division.* And hence it was, that, in the Hebrew computation of days, the diurnal measure of darkness always preceded the diurnal measure of light; thus *perpetuating a commemoration of the transactions of that first day.*

An equally unlearned and unphilosophical question has been raised, with respect to the *sense* in which we are to understand the word *day* in this recital. This question has been generally moved by persons profound, perhaps, in *physical* science, but not equally so in *learning* and in *moral* philosophy; and it has been suggested to their minds, not by any real obscurity in the terms of the record, which are clear and precise, but merely by the opposition of those terms to *certain preconceived notions and speculations,* into which they have drawn their own judgments, or into which they have suffered their judgments to be drawn. Those persons constitute chiefly that class of speculators, who resort to the schemes of *compromise* and *concession* to which I have already adverted. Their *theories,* oblige them to seek for much *larger measures of time* than the historian supplies; they must, therefore, either accept or reject his testimony *in toto,* neither of which they can venture to do, or, they must endeavour to *compel his language* to bend and conform itself to their speculations, which they vainly flatter themselves they are able to do, by interpreting יום, *iom — day*, to signify, *a period of undetermined length*[1]*:* a sense, which the Hebrew language absolutely and radically disclaims. But, *why* did they need any other sense than that which the text *literally* imports? was it, because it is easier to God to *crystallise granite in a series of ages*, than to *create it crystallised?* So, it seems, they thought; and therefore, they would not conclude with Newton, that "*God in the beginning* "*formed, and set in order, all material things by the* "*counsels of His intelligence,*" nor admit with Bacon, that "*the earth was created in one moment* "*of time;*" but maintained, in opposition to both, "*that it rose out of a confused assemblage of* "*elements, by mere laws of Nature:*" which laws demanded a *length of time proportioned to the supposed operation*, and therefore, they must *obtain* that length of time, *somehow or other*[2], from the text of Moses.

But, Newton and Bacon were in no such dilemma, their conclusions went directly to the point of the *literal statement* of the record; they were thoroughly impressed with the self-evidence of the truths — 1. that *time*, which is an *effect* of God's creation, could not have pre-existed to His acts of creation, and therefore, could not have been a *necessary co-agent* with Him in the performance of those acts; and 2. that perfect wisdom and perfect power in concurrence, must produce *perfect works:* therefore, the measures of time assigned by Moses to those acts, amply supplied all their demands. Since, then, such a violation of the record is only needed by those who advocate a geological system which we have shewn to be fundamentally erroneous, by shewing it to be fundamentally contrary to the philosophy of Newton; it remains for us to conclude with Rosenmuller, upon every ground of sound learning, criticism, and philosophy: — " *Dies* intelligendi sunt *naturales*, quorum unusquisque ab " *una vespera* incipiens, *altera* terminatur; quo " modo Judæi, et multi alii antiquissimi populi, " *dies* numerârunt[1]. — That we are to understand " the Mosaical days of creation to signify *natural* " *days*, each of which, commencing from *one* " *evening*, is terminated by *the next;* in which " manner the Jews, and many others of the most " ancient nations, reckoned *days*." In the *first* of those *natural days*, the *whole mineral fabric* of this globe was formed *at once*, of such size and figure, with such properties, in such proportion to space, and with such arrangement of its materials, as most conduced to *the ends* for which God created it. In that *first, immediate, universal formation*, the Almighty Artificer produced *effects* analogous to those which were to result from the *new causes* which He then ordained; but, the *sensible phenomena* of those *effects*, could not reveal or determine *the mode* of their formation, because *that mode was in direct contradiction to their sensible indications*, and absolutely *ανεξιχνιαστος*[1]—*untraceable* and *past finding out* by any scrutiny of man.

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[1] DE LUC, *Lett. Géol.* p. 95.

[2] Buffon, is ingenious in detecting measures of *time* in the Sacred Text. We read simply, " God *saw* the light, that it was good." Yet, upon this word "*saw*," Buffon thus comments. " God *took time — prit lui-même* " *du temps* — for considering it; and *this time*, during which it pleased " God to *consider* the light that it was good, that is, useful to His " designs; *this time, I say — ce temps, dis-je — pertains to, and ought to* " *be added to, the time of the Chaos.*" — *Théorie de la Terre*, tom. vi. p. 31, 4to. *Quousque tandem!*

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[1] Page 47. — " Galli dies sic observant, *ut noctem dies subsequatur*." CÆSAR. *de Bell. Gall.* L. vi. c. 17. — " Athenienses diem statuerunt, *ab* " *occasu Solis ad occasum*." CENSORINUS *de Die Nat.* c. 23.

III. Let us now consider the *principal errors* which have resulted, from a defective interpretation of this first important article of the historian, among erudite and genuine scholars.

When the excellent author of the “ *Vindiciæ* “ *Geologicæ*” affirms — “ that Moses *does not deny* “ the existence of another system of things prior “ to the preparation of this globe for the recep- “ tion of the human race, *to which he confines* “ *the details of his history*[2];” and, when the valuable author of “ *Records of Creation*” affirms —“ we are not *called upon to deny* the possible “ existence of previous worlds, from the wreck of “ which our globe was organised[3]:”—if these learned writers spoke only of those *propositions*, we must of necessity agree with them; because, no such propositions are stated in the history for denial, and therefore, Moses neither denies them himself, nor calls upon us to deny them. But, when the former writer expounds his meaning, and adventures the broad assertion — "that "there is *nothing in the proposition inconsistent with* "*the Mosaic declaration of the Creation*[1];" I am compelled peremptorily to deny his position: both, on the strength of the arguments which have already been, and will hereafter be enforced, in proof that the Mosaic declaration excludes all rational supposition of a *prior* system of things, or of a *previous* world, by asserting the present world and the present system to be the same that God made "*in the beginning*" or *at first;* and also, on the insufficient and illusory nature of the arguments by which the position is attempted to be maintained: a position, which can only be regarded as an unwarranted *indulgence of time* to the importunity of the Mineral Geology, not as a sound and critical deduction, legitimately yielded by the *data* of the Mosaical. The monuments of "*wreck*" in our globe, will thoroughly expound themselves by means of those *data*, without the aid of the deceptious auxiliary hypothesis of *prior systems* and *previous worlds;* and will, at the same time, reveal the error of the allegation, that Moses "*confines the details of his history to the* "*human race.*"

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[1] Rom. xi. 33.

[2] *Vindic. Geol.* p. 24.

[3] *Records of Creation*, vol. ii. p. 356.

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[1] *Vind. Geol.* p. 24.

It was the phantom of *Time,* which so much infatuates *physical philosophy,* that unwarily seduced the upright and learned Rosenmuller into the imagination of a *previous earth,* and the learned and pious Patrick into the admission of an *elemental chaos;* but yet, mutually in contradiction to each other. Both those commentators, fascinated into a belief that they were bound, in deference to the *mineral geology,* to find in the Mosaic record *some great interval of time* exceeding any measure of which it truly and really speaks; and, unaware that the power which had lured them into this weak submission was a mere *ignis fatuus;* were led to violate the import of the text, the former *uncritically,* the latter both *uncritically* and *unphilosophically.* I make this distinction, because, though both of them forced the text *uncritically* to make it produce the *length of time demanded;* yet, Patrick alone admitted the *unphilosophical* doctrine of *a chaos,* which Rosenmuller sensibly and learnedly condemned.

To enable himself to discharge his tribute of *length of time,* the learned German marshalled together all the particles ו, *vau,* connecting the clauses of the first three verses; and, regardless of the caution contained in the sound criticism above adduced from Tympius, (that this particle takes the place of all the conjunctions "*according*

" *as the sense and sequence of the discourse deter-*" *mines its signification,*") he took upon himself to give to it the unsupported indefinite adverbial signification of *posthac* — *afterwards:* not in any *particular place,* but, *wherever* the reader might *choose* so to understand it, in any *one of three* different places of which he *gave him the choice.* Thus, says he, we *may either* read:

" In the beginning God created the heaven " and the earth. *Afterwards,* the earth was " desolate," &c.

Or,—" was desolate, and darkness was upon " the face of the waters. *Afterwards,* the Spirit " of God," &c.

Or,—" The Spirit of God blew upon the face " of the waters. *Afterwards,* God said, let there " be light[1]."

By this lawless method of interpretation, the true and intimate connexion of the clauses is violently severed and destroyed; and an *hiatus* is artificially and arbitrarily contrived in the sequence of the narrative, which may be converted *ad libitum* into the *interval required by the mineral geology,* and be stretched out into any " *epocha of nature*" which system or circumstances may think good to desire or demand.

" *Whichsoever* of these explications you adopt, " (adds this too compliant expositor,) it *must* " denote a *twofold* creation: — 1. The *first pro-*

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[1] *Antiq. Tell. Hist.* p. 27.

" *duction* of all things; 2. The *renovation* of this " earth. But, it will be asked, *which of these* " *three interpretations is to be preferred to the* " *others? That is a point which I cannot take upon* " *myself to determine:* — sed quæritur: *utra harum* " *interpretationum alteri sit præferenda? Ego nihil* " *definiam*[1]." And why did this good man lend himself thus to a proceeding, so utterly unworthy of his learning, his judgment, and his piety? " Because, forsooth, those who are *skilled in* " *mineralogy* have discovered, in the interior of " the earth, many vestiges of a *very ancient* " *and long-continued inundation, which they think* " *must have preceded the deluge of Noah:* — depre- " hendunt enim *metallicarum rerum periti,* in " interioribus terræ, multa vestigia *vetustioris et* " *diuturnioris cujusdam inundationis, quam diluvium* " *Noachicum præcessisse putant*[2]." But this, to say the least, is a very *uncritical* method of exposition; more especially, since, by adhering closely to the text as it stands, we shall, in due time, arrive at the true solution of every difficulty which the " *vestiges of that more ancient and long-* " *continued inundation*" can present to us. The sense of *posthac* — *afterwards,* cannot critically pertain to the particle in any one of the places in question; but, the estimable writer has too courteously *forced* it upon it, in weak submission to the presumptuous demands of the mineral geology.

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[1] *Antiq. Tell. Hist.* p. 28. [2] Ib. p. 31.

It was not thus, that Bishop Patrick sought to satisfy the same presumptuous demands. By hastily assuming the *tohu va-bohu,* (which only express the *unapparent and barren state of the mineral globe at its first creation,* but in no sense the *imperfect condition of its substance,*) to signify a state of *mingled and confused elements,* he deemed it necessary to espouse the doctrine of a *chaos* in the most positive and unqualified manner; hoping to save the credit of the sacred historian, by thus contriving for him an *indefinite length of time* which his history absolutely disclaims. He therefore incautiously affirmed; that *Moses,* in *those two words,* gives " *a description of that which* " *the ancients called the* CHAOS; *wherein* (says " he) *the seeds and principles of all things were* " *blended together:—which was indeed the first of* " *the works of God; Who, as Moses shews in the* " *sequel, produced this beautiful world out of this* " CHAOS. *How long* all things continued in mere " confusion after *the* CHAOS *was created,* before this " light was *extracted from it,* we are *not told.* It " might be (*for any thing that is here revealed,*) *a* " *great while;* and, all that time, the Mighty " Spirit was *making such motions in it,* as pre" pared, disposed, and *ripened* every part of it " for such productions as were to appear, suc" cessively, in *such spaces of time as are here and* " *afterwards mentioned by Moses;* who informs us, " that after things were *so digested and made ready* " (*by long fermentations perhaps,*) to be wrought

" into form, God produced *every day, for* SIX
" DAYS *together*, some creature or other, till all
" was finished; of which, *light* was the very
" first." The learned Bishop dwells much upon his " CHAOS;" which he exhibits in capital letters, five several times in the first six pages of his *Commentary*.

This exposition was plainly directed with *an eye to a particular object*, namely, to *objections* drawn from the visionary conclusions of the *mineral geology*; and, with the pious desire of precluding those objections, by presenting an unobjectionable statement in the first instance. But we may here truly say,

> Incidit in Scyllam dum vult vitare Charybdim:

for, the *interpretation* which is here presented, is as directly contradictory of the sense of the record as the *objections* which it was designed to overrule.

If all those various " *creatures*," of which " *light was the first*," were produced in SIX *natural days*, then they could not have been produced by the *physical operation of any known secondary causes*; and, if they were produced, as in that case they must have been, by the *immediate act of the First Cause*, why was the action of that First Cause *preceded by " a great while*," during which " things were digesting, *ripening, and making ready*, " by long fermentations?" For *what end* were all those processes employed? for, since they are neither expressed nor intimated in the *record,* they must be supposed to be *inductions of reason* on the part of the learned Commentator. Was it, that the *First Cause could not act until secondary causes had made the subject matter ripe and ready for Him?* Was it, that the Creator *found Himself impeded by certain co-eternal laws which He could not control,* and that He was therefore *obliged to wait the term of their necessary operation?* Or, was it that He first *created secondary agents, to retard an after-work which He did not intend to execute by secondary agencies, but by immediate acts of His own divine power?* The suppositions are all equally in opposition to *reason* and to the *record.* If, then, the *after-work* was not to be effected by *secondary causes* but by God's own *immediate causation,* which is here granted, *reason* directs us to conclude, that no secondary causes were engaged to assist Him by an *antecedent work;* but, that the truth is as He Himself has pronounced: "I am "the Lord, who made all things; who stretched "forth the heavens ALONE, who *spread abroad* "*the earth* BY MYSELF[1]:—who *spake,* and it was "*done;* who *commanded,* and it was *confirmed*[2]." Such, also, is the doctrine which the historian plainly designed to inculcate and establish here; and it is truly astonishing, that the consequences inevitably and obviously resulting from the hypothetical interpretation of the learned and venerable Prelate, should not have exposed themselves to his own discernment.

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[1] Isaiah, xliv. 24.

[2] Psalm xxxiii. 9.

Yet, we find the same visionary hypothesis heedlessly pursued by a much later writer. "To "the assemblage of these *as yet inert elements,* "Moses gives the name of *Abyss;* profane au- "thors have *called it Chaos. All* seem to *mean the* "*same thing;* the *chemical laboratory of universal* "*Nature,* the *general deposit of the embryos of all* "*existing natural substances*[1]*!*" It is difficult to pronounce, whether a want of knowledge or a want of reflection most signalises this monstrous proposition; which makes "Moses and profane authors "to *mean the same thing,*" and which interprets the *abyssal ocean* of the former's *inspired history,* to be identically the *same thing* as the *elemental chaos* of the latter's *ignorant fiction.*

Rosenmuller remarks, with just reprobation, on the preposterous inference of a *chaos* from the language of Moses. "It is wonderful," says he, "that so many interpreters could have persuaded "themselves, that it was possible to detect a "*Chaos* in the words תהו ובהו—*tohu va-bohu!* "—though many also have perceived, that a *Chaos* "cannot be derived from the *words of Moses.* "That notion, unquestionably derived its origin "from the *fictions of the Greek and Latin poets;* "which were transferred, by those interpreters, to

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[1] Howard, *on the Structure of this Globe,* p. 483.

"Moses. But, *to explain Moses by the poets, what "is it, but to transfuse water from a muddy stream "into a clear and limpid fountain?*" He then recites all the fables of a *chaos*, from Berosus to Ovid, and concludes thus: "But since these "things are so, it is not so surprising that many "interpreters, when they pass from the works of "the *heathen philosophers and poets* to the exposi-"tion of *Scripture*, should imagine that they "recognise the *same chaos* in the *Mosaic history*. "Yet the Rabbins, who were not prepossessed "with these particular fictions, apprehended the "power and meaning of the original words far "more correctly.—If we follow the practice of "the language, the Hebrew phrase has this sig-"nification: *The Earth was waste and desert*, or "as others prefer, *empty and vacuous*, i. e. *uncul-"tured and unfurnished* with those things with "which the Creator afterwards adorned it[1]."

The doctrine of a *chaotic mixture of elements* or *first principles of things*, is not more abhorrent to the *philosophy of* NEWTON, who expressly reprobates it, than it is to the *record of* MOSES; if the latter be considered without any previous system, and if it be thoroughly and critically understood. The progress of tradition through ages of heathen darkness and ignorance, may have perverted the *abyssal ocean* distinctly recorded by Moses into a *chaos* characterised by that darkness; but, to make the *chaos*, therefore, the rule for interpreting that *ocean*, is to invert the order of rational argument, and to reason *ab ignoto ad notum.*

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[1] "Mirum est multos interpretes *Chaos* his verbis, תהו ובהו, in-"digitari sibi persuadere potuisse:—perspexerunt tamen multi *Chaos* "non posse ex verbis Mosis derivari. (Ut alios taceam, satis erit S. V. "ZACHARIÆ nominâsse. Vid. *Bibl. Theologie*, P. ii. p. 11, 12.) Originem "debet hæc opinio sine dubio Poetarum Græcorum Latinorumque fig-"mentis, ab interpretibus Mosi illatis. *Sed Mosen ex Poetis explicare, "quid aliud est, quam aquam ex turbidis rivis haustam inferre limpido fonti?* "—Rabbini, qui fictionibus, quod hanc rem attinet, haud præoccupati, "vim et potestatem vocum indagârunt, multo rectius. e. g. ONCKELOS:

Since the publication of the first edition of this work, I have read, and, I must acknowledge, not without very considerable astonishment, the observations of the learned Bishop Horsley on this first chapter of Genesis, in the first chapter of his posthumous work, entitled "*Biblical Criticisms;*" in which chapter of observations, excepting the passage that I have extracted in a note to the preceding chapter, I am unable to discover any of that acute criticism and profound erudition, which abound so richly in all his other writings. That deficiency, however, is to be easily traced to *two causes;* 1. To a preconceived opinion, that he, like Bishop Patrick, was bound to concede to the mineral geology a *Chaotic period of the matter of*

“ *terra erat deserta ac vacua.* JONATHAN : *terra erat deserta à filiis homi-*
“ *nis, et vacua ab omni jumento.* Quocum *Targum* HIEROSOL. consentit.
“ Et rectè. Non enim opus erat *vocibus affingere significationes quas*
“ *nunquam habuerunt*, cùm in libris V. T. ipsis occurrant, ut non difficile
“ sit reperire veram earum potestatem.—Si itaque usum linguæ sequimur,
“ phrasis Hebraica hunc habet sensum : *terra fuit vasta et deserta*, vel
“ ut alii malunt, *inanis et vacua*, i. e. *inculta*, nec iis rebus *instructa erat*,
“ quibus postea Creator eam ornavit.”—*Antiquiss. Tell. Hist.* p. 19—23.

this globe.—2. To an experimental sense, of the unsurmountable difficulty of arguing *Divine Creation* under that unreasonable concession. "The "interval, between the production of the matter "of the chaos and the formation of light, (says "the right reverend critic,) is undescribed and "unknown." And why?—because the *Chaos itself* is "undescribed and unknown" in the cosmogony of Moses. It is impossible, to reconcile the notion of a *Chaos* with that cosmogony; because, that notion originated in an ignorance of the *divine creation* which constitutes the fundamental principle of the latter. To attempt a reconciliation and union of the two, is therefore the same, as to attempt to reconcile the doctrines of a *vacuum* and a *plenum*, or any other two contradictory doctrines; and must be attended with the same results.

From those two causes alone, has proceeded that penury of learning and argument, which so remarkably characterises the first chapter of the *Biblical Criticisms.* Their learned author abstains, with a reserve totally irreconcilable with his usual sagacity, from all investigation of the *true meaning* of the words, *tohu va-bohu;* although it must be manifest to every one, that the *whole question* of a *Mosaic Chaos* rests, absolutely and exclusively, upon the interpretation of those two words. He overlooks, likewise, the essential critical fact which has been pointed out; that the sacred historian has already affirmed the *creation* *of the* ארץ—*earth*, (which he explains to signify, the יבשה—*dry substance*,) when he states the *circumstances attending its creation* in those words, *tohu va-bohu*. These, we have seen, were *invisibility* and *bareness:* circumstances which we are sure must have pertained to it, inasmuch as it was enveloped by the waters, and neither light, nor animal or vegetable structures, were yet created.

But, let us see how the case will stand, if we admit the *Chaos*, which the learned Prelate adopts, with so many others, from the heathen poets and philosophers; for, it is derived from no other quarter. According to this interpretation, we must read; "In the beginning God created "the heaven and the earth: but *the earth was* "*Chaos*." And yet, what says the heathen original?

> Παντων μεν πρωτιστα Χαος γενετ'· αυταρ επειτα
> γαι' ευρυστερνος[1].

"The *first* of all things was *Chaos*, but *afterwards* "was the *earth*." Here, the heathen authority directly contradicts the Christian exposition, although the Christian exposition has only the heathen authority to plead in its support. The heathen, *presupposed a Chaos, in order to obtain an earth;* "Hesiodus non à *Deo conditore* sumens "exordium, sed à *Chao*[2]—Hesiod beginning, not

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[1] HESIOD. *Theogon*. 116.

[2] LACTANTIUS, lib. i. cap. 5.

“ with a *Creating God,* but with *Chaos:*” Lactantius evidently considered these two principles, as essentially adverse, and incompatible. But, Moses *obtained an earth by the creation of God.* How inconsistent is it, then, in admitting the Mosaical statement of the *creation of this earth* by the wisdom and power of God, to admit at the same time, that the *earth* so created was a *Chaos which should produce an earth?* or, how is it possible to avoid perceiving, in those two adverse admissions, the *confusion of two principles essentially hostile and irreconcilable?*

That heathen *Chaos,* was apprehended and represented with great diversity. Some, with Aristotle, understood the Chaos of Hesiod to signify merely *τοπος*[1]—*place* or *void space;*—thence *κενον*[2]—*vacuity;* and these derived Χαος, like *χασμα,* from *χαινω*—*dehisco*—to *gape.* Others, (like many of the mineral geologists of our own age,) assumed it to imply “ *a confused assemblage of elements*”—“ *rudis inordinatæque materiæ confusa congeries*[3].” This notion, constituted the principle of the Phœnician and Chaldaic cosmogonies, afterwards embraced by some of the Greek philosophers; and these derived *χαος* from *χεω*—*fundo*—to *pour out.* But, Josephus knew of no such article as a *Chaos* in the Mosaic cosmogony; for, he pointedly affirms, “ that Moses does not begin to speak of any *natural operation,* until after the

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[1] *Natur. Auscult.* cap. 2. [2] Ibid. [3] LACTANTIUS, lib. i. cap. 5.

"Divine cessation from creative operation on the "*seventh day*[1]."

The Hebrew Platonist, Philo, appears to have been the first who grafted the *heathen Chaos* upon the *Mosaic record;* and, from that graft, has sprung forth the *Christian Chaos.* Yet, Philo did not find it in the words, *tohu va-bohu,* where alone the *Christian* imagines that he has discovered it; for, he expressly interprets those two words to signify, αορατος και ακατασκευαστος[2]—*invisible and unfurnished,* conformably with his ancient countrymen, the Septuagint, and Josephus; but he *presupposed it,* through a bias received in the Greek or Phœnician schools of philosophy. "The Creator (he says) "made the heaven incorporeal, and the earth *invisible,* and poured the entire mass of the waters "upon the whole earth"—ὁ ποιων εποιει ουρανον ασωματον, και γην αορατον.—τὸ συμπαν ὑδωρ εις απασαν την γην ανεκεχυτο: Thus far he followed the *history.* But he added, from his *Phœnician physiology;* "that the waters, thus poured upon the "earth, penetrated into it as into *a sponge,* "so as to reduce it to a *deep mud*"—και δια παντων αυτης επεφοιτηκει (το ὑδωρ) των μερων, οἷα σπογγιας αναπεπωκυιας ικμαδα, ὡς ειναι τελμα τε ἁμα

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[1] και δη και ΦΥΣΙΟΛΟΓΕΙΝ Μωϋσης μετα την ἑβδομην ΗΡΞΑΤΟ. *Ant. Jud.* lib. i. cap. 2.

[2] "The Jewish Lawgiver Moses begins thus. "In the beginning God "created the heaven and the earth, *but* the earth was *invisible* and *unfurnished*"—ὁ Ιουδαιων νομοθετης Μωυσης—αρχεται τον τροπον τουτον· Εν αρχη εποιησεν ὁ θεος τον ουρανον και την γην. ἡ δε γη ην αορατος και ακατασκευαστος. *De Mundi Incorrupt.*

και βαθυν πηλον[1]. This, was the *Chaos of Philo;* which notion, therefore, he did not attempt to deduce from the words of the record—*tohu va-bohu,* but *superadded* it to them from his own *physical theory.* Aquila and Theodotion, who came after Philo, are the first who appear to have brought this notion to the interpretation of the words *tohu va-bohu,* which they did, by rendering those words *κενὸν και ουδεν*—*void and nothing.* But, in so doing, they manifestly betray the quarter from whence they derived the notion; as likewise do those who followed, and who have introduced the interpretations, *void,* and *without form.* For Aristotle first interprets *χαος*—*Chaos,* to signify, *τοπος*—*place* or *space;* next, *κενον*—*vacuum* or *void;* and he then inquires, whether that *κενον*—*void,* had *ειδος*[2]—*form?*—The origin of the *void* and *without form,* is thus traced to the *heathen school of Greece.* No such senses were ever assigned to the Hebrew words by those ancients, who only looked for their signification within the Hebrew church and language. Symmachus approaches near to the true interpretation, though he inverts the order of the words, when he renders the Hebrew, *αργον και αδιακριτον*—*inactive,* i. e. *unproductive;* and *undistinguishable,* i. e. *imperceptible.*

The *heathen Chaos* grafted by Philo on the Mosaic record, was therefore the *first parent* of the *Christian Chaos* so much in fashion in the present and former age; a doctrine, which we may and must nevertheless pronounce to be, with relation to the *logical principle* implanted within us, of all the conceptions that ever obtained a shelter in the human mind, the most *incongruous* and *irreconcilable*, since we have seen that it is peremptorily and equally denied, both by *reason* and by *authority*, both by *philosophy* and by *philology*, in the very *premises* from which it is laboured to deduce it. To the preceding ancient testimonies produced against the modern fictitious interpretation of *tohu-vabohu*, I will yet further add the following reflective and unequivocal testimony of Ambrose, in the fourth century: "The earth was therefore "*invisible*, because, being covered by the waters, "it could not have been *visible* to corporeal "eyes; as, things lodged in the depth of waters, "are beyond the reach of ocular sight and pene- "tration. Not, that any thing is invisible to "God; but, *a creature or creation of the world, is* "*here charactered with relation to a creature—sed* "*creatura mundi, creaturæ utique æstimatione cen-* "*setur.*—The earth was also *invisible*; because, "no *light*, no *sun*, as yet illumined the world[1]." Such was the ancient prescriptive signification of a term, which the moderns have *gratuitously* determined, shall "*mean the same thing as the* CHAOS "*of profane authors*[2]."

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[1] *De Mundi Opific.* p. 6 and 8. See above, p. 123, note 2.

[2] *Natur. Auscult.* cap. 8.

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[1] *Hexaëmeron*, lib. i. cap. 6.

[2] See above, vol. i. p. 197.

CHAPTER IV.

THE historian proceeds to his *Second* Article, in which he relates the events that distinguished the *Second diurnal revolution of this globe.*

"*And* GOD *said, Let there be a* FIRMAMENT
"*in the midst of the waters: and let it divide the*
"*waters from the waters.*
"*And* GOD *made the firmament, and divided*
"*the waters which were under the firmament from*
"*the waters which were above the firmament.*
"*And it was so: and* GOD *called the firmament*
"HEAVEN.
"*And the evening and the morning were the*
"SECOND DAY."

The word רקיע, which our version renders *firmament*, from the Latin *firmamentum*, is rendered by the Alexandrian interpreters *στερεωμα*; which word denotes a *firm and permanent support.* That support was to sustain *a part* of the waters, which *part* was now to be separated from the waters *beneath.*

A recent learned, but adventurous writer, has emphatically pronounced his dissent from this interpretation: "the proper and literal import of "the word (he insists) is *the expansion;* and *so* "*doubtless it ought to have been rendered;* for, “the word *firmament* by no means exhibits the real idea of the Hebrew substantive[1].” That great oriental authority Michaelis, however, pronounces just as emphatically against him: “According to what I have said of the signification of this word, as confirmed by the practice of the Hebrew and Syriac tongues, the word רקיע will not signify *expanded*, but *confirmed*, or, to use the term employed in the Vulgate, the *firmament*. In Gen. i. 6, it can hardly signify any thing else than the *atmosphere sustaining the clouds*. So in Ezek. i. 21, 22, where it expresses the *basis* or *pavement* of the chariot of God[2].”

This article, therefore, implies; that there were *waters* above the aqueous surface of the globe which were *separable*, though not yet *actually separated*, from it. It therefore relates; that the universal *watery vapour*, which had been in course of continual exhalation during the preceding day from the universal watery surface, was now separated from it and raised to a high elevation above it, by the creation of the *aerial atmosphere;* so that the vaporous body formed a canopy *above* the globe, instead of enveloping it like a cloak, in *immediate contact* with the water. Rosenmuller, well applies to this place the remark of Pliny: "*what can be more wonderful, than waters stationary* "*in the sky!—quid esse mirabilius potest aquis in* "*cælo stantibus*[1]*!*" which phenomenon, we know, is only produced by the "*atmosphæra nubes por*"*tans,*" *the* רקיע or *firmamentum.*

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[1] FABER, *on the Three Dispensations*, vol. i. p. 129.

[2] “Ex his, quæ de verbi significatu, usu linguæ Hebraicæ et Syriacæ firmata diximus, nomen רָקִיעַ non erit *expansum*, sed—*firmatum*, seu, ut vocabulo Vulgatæ utar, *firmamentum*.—Gen. i. 6, vix potest nisi *atmosphæra* esse, *nubes portans;* sicque et Ezech. i. 21, 22, ubi *basis*—*pavimentum* est currus Dei tonantis.” *Suppl. ad Lex. Heb.* no. 2386.

The globe was thus disengaged from its incumbent vapour, but still, the *effect* of light was alone apparent; for, congregated *clouds* had succeeded to terrestrial *mist,* and continued to render the *cause* of that effect *non-apparent,* and therefore, *optically non-existent:* as we ourselves experience, during the prevalence of similar weather. It is this that the sacred historian describes, when he says; "*for many days neither sun nor stars ap*"*peared*"—μητε ἡλιου μητε αστρων επιφαινοντων επι πλειονας ἡμερας[2]. Homer also describes, in a similar manner, the *optical effect* of a continued cloud enveloping two contending armies, during a day of obstinate conflict:

> ουδε κε φαιης
> ουτε ποτ' ΗΕΛΙΟΝ σοον εμμεναι, ουτε ΣΕΛΗΝΗΝ·
> ηερι γαρ κατεχοντο[3].
>
> Around so dense the murky clouds arise,
> It seem'd *nor Sun nor Moon possessed the skies.*

The *cause* of the diversity of day and night continued therefore to be *unapparent,* relatively to the earth; but, that *cause* was now in course of perpetual operation, and it therefore now completed the *Second Day.*

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[1] PLIN. *Hist. Nat.* lib. xxxi. [2] Acts, xxvii. 20. [3] Iliad. XVII. 366.

CHAPTER V.

THE historian proceeds to his *Third Article*, which consists of *two parts*:

> "*And* GOD *said; Let the* WATERS UNDER
> "THE HEAVEN BE GATHERED TOGETHER UNTO
> "ONE PLACE, *and let the* DRY LAND APPEAR.
> "*And it was so.*
> "*And* GOD *called the dry land* EARTH, *and the*
> "*gathering together of the waters called He* SEAS.
> "*And* GOD *saw that it was good.*

◆

> "*And* GOD *said; Let the* EARTH *bring forth*
> "*grass, the herb yielding seed, and the* FRUIT-TREE
> "*yielding fruit after its kind, whose seed is in itself*
> "*upon the earth. And it was so.*
> "*And the earth brought forth grass; and herb*
> "*yielding seed after its kind: and the* TREE *yielding*
> "*fruit, whose seed was in itself, after its kind:*
> "*and* GOD *saw that it was good.*
> "*And the evening and the morning were the*
> "THIRD DAY."

I. In the *first* part of this article, *two* vast and wonderful events of the most essential importance to *true geology*, because in them are laid the very first foundations of that *historical science;* but which, nevertheless, have most strangely failed to fix the attention both of commentators and geologists; are distinctly, though briefly, revealed for the apprehension of the intelligence; namely, 1. *the sudden formation of a* BED, *or* BASIN, *to receive and contain the universal mass of waters diffused over the solid and compacted surface of the whole mineral globe:* 2. *the consequent immediate drainage and* EXPOSURE *of a portion of that surface.*

The *second* part of the article, relates *the first formation of all the vegetable matter with which that exposed portion of the globular surface was immediately invested.*

We may here again observe, with Rŏsenmuller, that תהום, in the second verse, denotes the *abyss;* not in any sense of a "*chaotic ocean very different* "*in its chemical properties from our present sea*[1]," (an ocean which never existed out of the imagination of the mineral geology); but simply, of *the waters of the sea flowing without limit*[1]*:* for, what is called the *abyss* in the second verse, is in the same verse called also, המים, *the waters;* and the same המים—*waters,* become in this verse ימים, *the* SEAS, only by being *congregated in one place,* and therefore being *reduced within limits.*

II. Previous to these amazing operations, the globe, disengaged from its cloak of mist in consequence of the ascent of the vapours into the higher regions of the atmosphere, presents to the contemplation only the simple idea of an *aqueous spheroid:* its *solid parts,* being totally *concealed beneath the waters.* There were, as yet, "*no* "*depths*[1]"—אין תהמות, in the surface of those solid parts; but, it was now the design of God, to "*make* or *rend the depths by His Intelligence*[2];" to *expose a portion of those parts;* and, to *reduce the unlimited surface of waters, which concealed that portion, within limited bounds:* thus, converting the *uncircumscribed abyss* into a *circumscribed sea.* The record imports, that the *waters* which caused the concealment were to be extensively *removed,* and *collected into one place,* so that היבשה—ἡ ξηρα, *that substance which was dry beneath them,* might *be seen,* or *rendered visible,* תראה—οφθητω. Accordingly, Josephus thus represents the general operation; τη τριτη ἱστησι την γην, ΑΝΑΧΕΑΣ περι αυτην την θαλασσαν—"on the third day God established "the land, causing *the* REFUSION *of the sea* "*around it.*" This, also, the apostle describes; γη εξ ὑδατος και δι' ὑδατος συνεστωσα—"the earth "standing *out of* the water and *in the midst* of the "water[3];" and, from thence was derived that *relative description* which our version renders, "the "waters *under* the earth," but, which ought in strictness to have been expressed, "*below* "the earth:"—i. e. "the heavens *above* (the "earth), the earth *beneath* (the heavens), the "waters *below* the earth"—ὑποκατω της γης. In the same manner, the Greeks familiarly expressed the *position of the sea* with relation to *the land:* Thucydides opposes, *οἱ απο θαλασσης—επανωθεν—εν ηπειροις*—"those *distant from the sea—above—"inland,"* and, *ὁσοι κατω ῳκουν*—"those who "dwell *beneath* or *below,*" that is, *on the sea-coast.*

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[1] See above, p. 27.

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[1] Prov. viii. 24.

[2] Ib. iii. 20. See *Introduction,* § 25.

[3] 2 Pet. iii. 5.

The briefness of this clause, and the nature of the subject, have caused it to be little contemplated in proportion to its importance, and to the fulness of the instruction which it conveys; and therefore, it has not been observed, that the same sublimity which is universally perceived in the clause—*Let there be* LIGHT, *and there was light*; subsists equally in this clause—*Let the waters be gathered together unto* ONE PLACE, *and let the dry land* BE SEEN, *and it was so.* The sentiment of sublimity in the former clause, results from the contemplation of an instantaneous transition of the universe from the profoundest *darkness* to the most splendid *brightness,* at the *command of God.* All men familiarly apprehend the sadness of the former, and the delight of the latter; and they are, therefore, instantly sensible of the glorious nature of the change which was then so suddenly produced. But, the *nature of the change* which must necessarily have taken place, in *suddenly rendering visible a part of a solid continuous globe whose universal surface was overflowed and concealed by a flood of waters,* is not so familiarly and so instantly apprehended; the mind, therefore, does not care to dwell upon it, but is contented with receiving the general information, that *the* SEA *was formed.* Hence, both commentators and geologists have equally failed to draw the immediate and necessary inference from the revelation of that great and undeniably *geological fact*.

But, it is to the *stupendous* MODE *of that formation*, as an immediate and necessary inference demanded from our reason, that the historian here summons our contemplation. It is self-evident to reflection, that if the whole surface of a globe were covered and concealed by a fluid attached to it only by the law of *gravitation*, and if the whole of that fluid were to be afterwards collected in *one part* of that globe so as to render the *remaining part* of its concealed surface *visible*, the aqueous accumulation must take place *below the level of this latter part;* which effect could only be attained, by the congregated waters *acquiring that space in depth which they had lost in length and breadth:* for, accumulation in *height* is contrary to the law of fluids. In producing, therefore, the effect described in the record, the surface upon which the waters originally rested must have been suddenly *depressed and deepened* in all that portion of its extent on which they were to *remain;* and, to a depth sufficiently profound to *drain them off* from the other portion, which was to be *exposed, and left dry*. This is an *induction from the premises*, which will allow of no objection.

But, the mineral geology here asks—How was the deepening of any portion of the globe's surface possible, in the *nature of things?*—" If there were "*caverns* beneath it into which it could sink, *how* "*were they produced? Why were they commensurate* "*with the extent of the land*[1]*?*" To these questions, I give the following obvious answer.

That the globe of this earth was *formed cavous*, or *hollow*, is just as probable, *à priori*, as that it was *formed solid;* the probabilities are, at the least, *equal.* But, the positive divine declaration, that a place was afterwards *opened beneath its surface* to receive the superincumbent waters, determines the fact to the former probability, *à posteriori.* The *spherical figure* of the earth *alone*, renders it highly probable, that it is constructed in some manner, simple or complex, on the principle of the *arch* or *vault;* which principle we see variously employed in the works of *nature*, that is, of *God*, in all the three kingdoms of matter pertaining to this globe. It is, *a principle for producing surface without uniform solidity.* We see, in the vegetable world, the substance of the *apple* and the *turnip* solid throughout, but, we see that of the *cocoa-nut* extended in surface with moderate solidity. *Surface, with moderate solidity, was all that the uses of the earth required.* We can only be led to suppose it solid throughout, in order to suppose *a support for its surface;* but, when we know that a principle exists in the works of God, by which support may be given to *spherical surface* without

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[1] GREENOUGH, *Geology*, p. 190.

uniform solidity, that motive loses all its force; and the economy, simplicity, and skill manifested in the works of the creation guide the reason rather to suppose, that this admirable principle has been employed in the structure of the *sphere* of this globe, and of all the celestial *spheres*. The utmost extent to which man has penetrated below the surface of the earth, does not equal, in comparative depth, one thousandth part of the solid substance of the cocoa-nut; so that no argument for the continuous solidity of our globe, can be grounded upon our experience of the solidity of the crusts of its surface. If, then, the sphere of the earth is in any manner constructed upon a principle which its *figure* renders so highly probable; we see, both *how* a cavous interior was produced into which a portion of its surface might sink, and *why* the cavity should be *commensurate* with the extent of land constituting that *surface*[1].

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[1] "The *now ascertained density* of the earth (says Mr. Conybeare) "being *greater* than that which would result from an *entirely solid* "*sphere* of the most compact known rock, renders the existence of any "such cavity *very doubtful*." (*Geol. of England*, Introd. p. xv.) Nay, it would put an end to all doubt; but, this instructive writer here refutes his own argument, by *proving too much*. For, we know that the sphere of the earth is not entirely composed of the most compact known rock; if, then, its *density is greater* in its actual composition, than if that composition was so much *more compact*, its density cannot result from compactness and solidity; which would be a contradiction. There must, therefore, be some radical error, in this inference of density stated to be "*now ascertained*." After comparing the latest experiments of Bouguer, Maskeline, Playfair, and Cavendish, M. D'Aubuisson observes; that we are authorised to conclude, "that the *mean density* of the terrestrial globe

But, this operation of *deepening* implies, both a *disruption* and a *depression* of the solid parts which were to be deepened; and, as we are told the operation was *immediate*, within the *third diurnal revolution of the globe*, so must it also have been *violent*. In the *first formation* of the globe no *secondary causes* could have acted, because, secondary causes could not have existed until the *first formations* in which they were to reside had received existence; but, as soon as a *first formation* was produced, its *laws* received their force, subject always to the control and determination of their divine Author. In the *first act of creation*, this globe was produced *at once*, compact, solid, and complete in all its *mineral nature*, *order*, and *composition*, and from that moment, to speak by a figure authorised by God Himself[1], it was *subjected by Him to its own proper ordinances or* LAWS; as the *vegetable* and the *animal* systems were afterwards subjected by Him to *their proper* LAWS, from

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" is about five times greater than that of water, and consequently, nearly " double that of the mineral crust of the globe;" but he prudently adds, " these first results ought only to be regarded as *simple approximations*." (tom. i. p. 29.) M. Laplace, who thinks that the density of the earth increases progressively towards its centre, does not carry that speculation above 300 leagues or 900 miles below its surface; which would still leave an internal extent of above 5000 miles in diameter. But, his hypothesis of the progressively increasing density of strata, depends on the previous hypothesis of the earth *having been fluid;* for, he says—" such a disposition could only have existed in the case of the *entire earth having* " *been primitively fluid*." D'AUBUISSON, ib. p. 27. Thus, the existence of a *cavity* is not very doubtful.

[1] Jerem. xxxi. 35, 36.

the moment of their respective creations: for, as Bacon has oracularly pronounced, "*those laws* "*which we call of Nature, are nothing but the laws* "*of the Creation.*"

In causing, therefore, the *violent disruption and depression of that part of the solid surface which was to form* "A PLACE" *for the reception of the congregated waters,* that is, *a* BED *for the new sea;* the new laws and agencies of the mineral globe were rendered operative by their Almighty Creator, by the rule of his own mysterious plan. The solid "*frame-work or skeleton*" of the new globe, was therefore suddenly fractured and subverted, by those agencies and according to those laws, at the will of the Legislator, in all that part where *depression* was to produce *profundity;* and it consequently carried down with it, in *apparent confusion,* vast and extensive portions of the broken and comminuted materials or soils which had been disposed and compacted upon it, leaving other portions partially riven from their bases, or variously dislocated from their primitive positions. So that the *order* of the materials of the globe, which, in the *reserved* and *exposed portion,* retained their primitive positions and arrangements, were fractured, displaced, and apparently confounded in the other portion, which was to receive within itself the congregated waters.

Among the *new secondary agencies* either employed in producing, or necessarily accompanying, this tremendous *primitive revolution* of the mineral globe, we are not only fully authorised, but are directed by *reason* to assume; and we have the entire support of physical science in assuming, the agency and power of *volcanic expansion and explosion;* by which tremendous energy, acting with extraordinary and extensive effect, a vast portion of the *crusts* of the solid sphere would have become suddenly transformed from their native perfect state into a condition of *laceration* and *apparent ruin*. "In considering *volcanic phenomena* in the "most general manner, (says the mineral geo-"logy,) and in collecting what has been *observed* "in different parts of the globe, we see these "phenomena differing from each other, even in "our days, in the most striking manner. The "volcanoes of the Mediterranean, which alone "have been carefully studied, cannot serve as "*a type* to the geognost, and afford him the solu-"tion of *the great geogonic problems:*—some vol-"canoes act no longer but by their flanks:—"*others, hollow within, have no permanent opening* "*at the summit or on their flank, and it may be said,* "*act only* DYNAMICALLY, (*i. e.* by the principle "of *power*,) *in disturbing the surrounding earth,* "*fracturing the beds, and changing the surface*[1]." We know, from the same authority, "that *sulphur* "exists in abundance in the *primitive formations*[2]," and further, that the admission of *water* to the *subterraneous fires* which are constituent in the system of this earth, *produces volcanic action as a physical consequence*[1]*;* and therefore, the *fiat* of God, which by *disruption* gave extensive admission for the incumbent *waters of the abyss* into the interior of the newly constituted earth, would have been followed by volcanic ignition and explosion equally extensive and equally destructive, *in consequence of the provisions of His own laws*[2]. In what manner, or in what degrees, those excited *igneous agents* may have been caused to act by *fusion* also, and by *calcination*, on many of the fractured minerals, in that first terrific crisis of the globe; or, how far the vast *aqueous agent*, within whose bosom they operated, may have been ordained to *combine* with them in the production of *chemical results;* is the inscrutable secret of Him, Who employed and directed them.

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[1] HUMBOLDT, *Sup. of Rocks*, p. 408, 9. [2] Ib. p. 120.

Thus then was formed that "ONE PLACE, *into* "*which all the waters under the heaven were gathered together;*" the formation of which *place*, separately from that of the earth or globe, is repeatedly asserted in Scripture, and claimed for the Divine Operation[3]. The *primitive mineral formations* were thus early and mysteriously interrupted and disordered in their continuity, and a vast portion of them was rendered *fragmentary*, even upon the *third day* of their creation, and therefore, anterior to the existence of any *organised beings;* and, the new sides and surfaces of those fractured primitive masses became thenceforth exposed to the continual action of the waters, whilst the innumerable smaller fragments lay subjected to perpetual motion and trituration in their bed, generating a *sediment* continually increasing, and accumulating upon its *fragmentary base.*

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[1] D'AUBUISSON, tom. i. p. 213.

[2] "Who looketh on the earth, and it trembleth; Who toucheth the "mountains, and they smoke:" (Psalm civ. 32.) "they shall be molten "under Him." Micah, i. 4.

[3] Exod. xx. 11. Nehem. ix. 6. Ps. xcv. 5. Jonah, i. 9. Acts, iv. 24; xiv. 15.

This stupendous *revolution* or *modification* of the newly created globe, is commemorated by the great poet of the Hebrews, in these words: " *O* " *Lord, my God! Thou art clothed with honour* " *and majesty; Who laidest the foundations of the* " *earth, that it should not be removed for ever.* " *Thou coveredst it with the* DEEP, *as with a garment;* " *the* WATERS *stood above the mountains. At Thy* " *rebuke they* FLED; *at the voice of Thy thunders* " *they hasted away; they went over the mountains,* " *they went* DOWN *by the valleys unto* THE PLACE " WHICH THOU DIDST FOUND FOR THEM. *Thou* " *didst set a* BOUND *which they should not pass* " *over.*" — " We perceive (says the learned " Amama), that this description regards the *face* " *of the earth at the Creation.* So also observes " Aben Ezra. But, some one will perhaps say, " that the waters returned at the Deluge. I " reply, that we are to understand this passage

" of the *order of nature:* the Deluge, was an ex- " ception from that order[1]." In that passage of the Psalmist, we have a *poetical commentary* on this article of the record; which shews, how it was understood in the traditionary history of the *ancient Jewish church.* That violent and turbulent, though brief operation, by which *a bed* was suddenly opened for the waters to retire into from off a portion of the solid sphere, is here poetically represented, as " *the waters flying from* " *the rebuke and thunder of God, down to* A PLACE " *opened beneath for their reception;*" and, the *borders* of the undisturbed portion which was converted into a *dry land,* are described as " *a bound*" fixed by God to the further diffusion of the waters. The " *rebuke,*" and the " *thunders,*" manifestly imply a *crisis of stupendous and terrific* CONVULSION.

This, was the *first change,* or *revolution,* which the mineral substance of this sphere underwent from its created form " *before God made the depths;*" in which *revolution,* a vast portion of " its sur- " face was broken, and extensive tracts entirely " removed even to the solid granite, by the in- " conceivable agencies of Divine power[2];" and, it will be essential to the *sequel of the geological inquiry* that the reader should dwell, in minute contemplation, on the *details of the formation,* and on the necessarily *consequent condition,* of the SEA-BED thus produced, and consisting of the *fractured* and *apparently ruined* surface of one portion of the globe. The inveterate *oversight* of this great, I would say *prominent*, event in the Mosaic annals[1], is the true cause of the delusion under which the mineral geology adventures to assert a discordance between " the *Hebrew geology* and the *actual* " *observations of nature*[2];" and, it is the same *oversight* that has urged the able author of the " *Vindiciæ Geologicæ*" to advance, that " Geology " (*i. e.* mineral geology,) *goes further than the* " *Mosaic account*, in shewing that the present " system of this planet is built on the *wreck and* " *ruin of one more ancient*[3]." It certainly does not go *further*, nor yet *so far*, for it does not ascend to " *the beginning*;" it only, unconsciously, perceives the *vestiges of that first revolution* indicated by the record; but, from not viewing these by the light of the *Mosaic truth*, and employing only unguided imagination and hypothesis in attempting to decipher them, it assigns them *erroneously* with relation both to *cause* and to *time;* and thus, it anachronically assumes the epocha of " wreck

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[1] *Critic. Sacr.* in Ps. civ.—" AMAMA (Sixtinus) natif de Frise, Pro- " fesseur en langue Hébraïque dans l'Académie de Franeker, et disciple " de DRUSIUS." *Dict. de* MORERI. Amst. 1702.

[2] PARKINSON, *Fossil. Org. Remains,* p. 254.

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[1] " *Two only* points, (says Mr. Conybeare,) *can be in any manner* " implicated in the discussions of *Geology*: 1. *The Noachian deluge.* " 2. *The antiquity of the earth.*" (Introd. p. lvi.) The *first rending of the depths*, and the *first gathering together* of the universal waters *within a part of the globe*, so that a dry surface should appear *above them;* although the determination of these in questions of *geology* must be *essential;* has wholly escaped the consideration of this inquiring writer also.

[2] HUMBOLDT, *Superpos. of Rocks*, p. 23.

[3] *Vindic. Geol.* p. 24.

"and ruin" to have *preceded* that of the earliest transactions inscribed in the Mosaic history. But, the *sequel of the record*, will empower us to decipher all the *hieroglyphic* of these *monumental vestiges of that first revolution.*

When this great work of *forming the sea-bed* was accomplished, and when the *reserved portion* of the globular surface was exposed to the action of *light* and of *air*, that portion exhibited a mere mineral surface, brute, barren, and "unfurnished." But, it pleased God to employ it immediately to the end for which He had formed it, and for which He had disengaged it from the waters; and to furnish it, *at once*, with an universal investiture of vegetation, formed to maintain, by the laws of *decay* and *reproduction*, a perpetual succession and increase of *vegetable matter* to clothe and incase the *mineral*. An immediate act of God, similar to that which, on the *first day*, gave instantaneous and perfect existence to His *mineral system* of this globe, and established its laws, gave instantaneous and perfect existence also, on the *third day*, to His *vegetable system*, and established its proper laws in all the individuals composing it. The *first tree* and its *wood*, like the *first rock* and its *grain*, were produced by *a mode* in which no secondary causes could possibly have had any share; and, though the tree was afterwards to produce *seed* in which a *process of lignification* should originate, yet itself was formed *without the intervention of that process*. And, although it would *wear the appearance* of that process, yet the same reason which tells us that it would wear that appearance, tells us at the same time, that *the appearance alone would be no indication of the reality of the process;* so that it could exercise no delusion, upon any sane and well-advised intellect.

Thus, then, the earth was *at once* furnished, and invested with the *maturity of vegetation;* "with "the herb yielding seed," and "with the TREE "*yielding fruit*, after its kind." In the meantime, the clouded atmosphere still continuing, *light* continued to exist only as an *effect unconnected with its cause.* Its course, however, still proceeding, the evening and the morning completed the *Third Day.*

CHAPTER VI.

THE historian now arrives at his *Fourth Article,* and at the great and signal facts which it reveals. He relates:

" *And* GOD *said, Let the* LIGHTS *in the firmament of Heaven for dividing the day and the night,* BE *for* SIGNS, *and for* SEASONS, *and for* DAYS *and* YEARS; *and let them* BE *for lights in the firmament of Heaven* TO GIVE LIGHT UPON THE EARTH! *And it was so.*

" *And* GOD *made the* TWO *great lights* (namely,) THE GREATER LIGHT *to* RULE *the* DAY, *and* THE LESSER LIGHT *to* RULE *the* NIGHT, *together with the stars. And* GOD *disposed them in the firmament of Heaven* TO GIVE LIGHT UPON THE EARTH, *and to* RULE *the* DAY *and the* NIGHT. *And* GOD *saw that it was good.*

" *And the evening and the morning were the* FOURTH DAY."

1. The declaration of this important article, is of the utmost consequence to all the preceding exposition, because, it proves and establishes its correctness.

It is truly and excellently remarked by Rosenmuller—that " if any one, who is con-

" versant with the genius of the Hebrew, and
" free from any previous bias of his judgment,
" will read the words of this article in their
" natural connexion, he will immediately per-
" ceive; *that they import the direction, or deter-*
" *mination of the heavenly bodies to certain uses*
" *which they were to render to the earth.* The words
" יהי מארת are not to be separated from the rest,
" or to be rendered, *fiant luminaria, — let there be*
" *lights;* i. e. *let lights be made;* but rather, *let*
" *lights be,* that is, *serve, in the expanse of Heaven*
" *— inserviant in expanso cælorum — for distin-*
" *guishing between day and night; and let them be,*
" or *serve, for signs,* &c. For we are to observe,
" that the verb, היה, *to be,* in construction with
" the prefix ל, *for,* is generally employed to
" express the *direction* or *determination of a thing to*
" *an end;* and not the *production of the thing:*
" e. g. Num. x. 31, Zech. viii. 19, and in many
" other places." This observation, is most just and sound; and it is indispensably necessary, for the true apprehension of the passage before us.

2. The word מארת — *lights,* signifies, *apparent luminaries:* as, in common language, we call *light* — אור, that which is diffused as an *effect,* without referring to the *cause;* but, we call *lights* or *luminaries* — מארת, the *sources* of that light, as *lamps,* or *candles.* The same distinction between a *sensible effect* and a *sensible cause,* is found in the different significations of these words, אור and מארת — φως and φωστηρες. The *sensible effect,* was

produced on the *first* day; the *sensible cause*, is to be revealed on this *fourth* day.

3. The Hebrew word which we render "*rule*," is משל; a word, whose primitive and radical sense Michaelis could not trace in any of the surviving dialects of the East; from whence he conjectured, "*that it was either an Hebrew word which early* "*became obsolete, or that it was an exotic word* "*anciently adopted into the Hebrew*[1]." Its *general* signification, is known to be *dominari, imperare*—*to rule*; but, a question arises, *in what sense were those lights to* RULE? since the *lunar light* is not constant through all the *nights* of the year, as the *solar* is through all the *days*. The Greek version has rendered it by *αρχειν*; which word has the double sense, of *imperare* and *inchoare*, to *rule* and to *begin*. Now, the *old* Latin Version enables us to determine, in which of those senses the *αρχειν* of the Greek was anciently understood in this place, by rendering it *inchoare, ad inchoationem*—to *begin*; which interpretation, fixes the sense of *imperare* to that of *præire, ducere*—to *precede*, or *rule by leading*[2]; for, though *imperator*

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[1] See above, p. 176.

[2] Homer uses *αρχειν* in the same sense: Il. i. 495.

—— *προς Ολυμπον ισαν θεοι αιεν εοντες*
παντες ἁμα, Ζευς δ' ΗΡΧΕ·

" Jove, *first ascending* from the watery bowers,
" LEADS the long order of celestial powers."—POPE.

So again in Il. iii. 420, ΗΡΧΕ *δε δαιμων*—PRÆIBAT *autem Dea*.

and *dux* have a general sense in common, yet, each has a special and peculiar sense. To *rule*, in the sense of *ducere*, implies the *precedency* of a *ruler* at the *head* of his host, where he is both "*dux et princeps, dux et præfectus;*" titles, which are often so united in the same individual. In this sense, as the *day* was to be *led* or *ushered in* by the *solar orb*[1], as its *ruler*, so was the night to be *led* or *ushered in* by the *lunar:* which further implies, that the *moon* displayed its orb upon the *fourth evening* at the time when that of the sun disappeared, and that it thus *introduced the night.*

4. But, the difference between the singular יהי and the plural והיו, in the 14th verse, demands a corresponding difference in the interpretation; and therefore, if we would make that difference *apparent*, we must thus literally interpret: "FIAT "—*luminaria in firmamento cæli ad dividendum* "*inter diem et noctem,* UT SINT *in signa, et tempora,* "*et in dies, et in annos;* ET SINT—*ad illuminandum* "*super terram:*" i. e. "*Fiat ut luminaria sint* "*in signa,* &c. *et ad illuminandum,*" &c. The particle ו, signifies *ut*, in upwards of 300 passages: and והיו, signifies *ut sint*, in several of these[2]. This interpretation, therefore, will yield this literal sense in our language: "LET IT BE,

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[1] Jamque jugis summæ surgebat Lucifer Idæ,
DUCEBATque *diem.* Æn. ii. 802.

[2] NOLDIUS, *Concord. Heb.* p. 307.

"*that the lights in the firmament of Heaven for* "*dividing between the day and the night* BE *for* "*signs, and for seasons, and for days, and years,*" &c. i. e. "LET THE LIGHTS, &c., BE *for signs,* "&c.:" so just and important is Rosenmuller's induction from the construction of this passage; "de *determinatione astrorum ad certos quosdam usus* "orbi terrarum præstandos, esse sermonem—non "de eorum *productione*[1].—That the historian "speaks of the determination of the stars to "certain *uses* which they were to render to the "earth, and not of their *first formation.*"

II. In this article, the historian relates; that, after that portion of the mineral surface of the globe which had been extricated from the waters, and which, when it appeared, was ακατασκευαστος —*ungarnished,* had received its universal *garniture of vegetation;* this new order of matter was, upon this *fourth* day, to experience the *immediate and unobstructed influence* of the *cause of light and heat.* Upon this day, therefore, the *clouds* which had hitherto loaded the atmosphere, and which had excluded the heavenly luminaries, *were for the first time to be dispelled;* and those splendid bodies, were to acquire *their first optical existence* with relation to this earth. The amazing *Calendar of the Heavens,* ordained to serve for the notation of time in all human concerns, civil and religious, so long as time and man should continue, was therefore to be now first unfolded to the earth, with all the *visible indices of time* by which its measures were thereafter to be marked, distinguished, and computed; and the splendid *cause*, which had hitherto issued its effect of light through an *interposed medium*, was to dispense that light to the earth *immediately*, in the full manifestation of its effulgence.

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[1] ROSENMULLER, Sen. p. 61, 62.

And, let us now direct our very particular attention to *one signal circumstance* in the allotment of this *Fourth Day* for this especial purpose —"*the determination of the heavenly bodies to the* "USES *to which they were severally designed to* "*conduce, as indications of time;*" a circumstance of *internal evidence*, which confirms and fixes the truth of this interpretation. It is this: that the particular luminary, which was *to lead on*, and so *to* RULE *the night*, and to become from thenceforth the most familiar and most important *natural index* for the measurement and division of time, viz. "*the* MOON, *the faithful witness in heaven*[1]," does not acquire *optical existence*, that is, does not become decidedly *apparent to the earth* by the laws of *nature*, that is, of *creation*, until the *third evening of its revolution*, according to our common computation, which answers to the *fourth evening* of the ancient *Mosaical day* or *nycthemeron; our* computation connecting the evening with the *preceding day-light*, but the *Mosaical* computation with the *succeeding day-light.*

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[1] *μαρτυς εν ουρανῳ πιστος.* Ps. lxxxix. 37. "*He made the* MOON *also* "*to serve in her season, for the indication of times and the sign of the* "*world*"—*και σεληνην εποιησε εις καιρον αυτης, εις αναδειξιν χρονων, και σημα αιωνος.* Ecclesiasticus, xliii. 6—8.

The fact of this *coincidence*, is indeed most remarkable and surprising. It shews, that the Creator reserved the exposure of His heavenly calendar for *the day* when the planet, which by His own laws was to *rule the night*, had acquired, by those same laws, the position that *first* enabled it to *display its domination.* From this wonderful correspondence and coincidence, of the day of *Creation* in which the sun and moon were first exhibited as "*ruling the day and the night,*" with the day of the *lunar revolution* in which, by the laws of creation, the moon is first able to acquire its *ruling character* in the heavens, we derive a very extraordinary and unlooked-for confirmation of the soundness of our interpretation. And from hence we may, logically and philosophically, further infer; that when, in the beginning, "*God* "*created the heaven and the earth,*" when He gave to the earth its *first impulse of rotation*, and when He *first illumined the solar atmosphere* by His Word, therein *giving origin to Time,* the two presiding luminaries were disposed in that particular relation to the earth which astronomy calls *inferior conjunction;* and that, in the *third* diurnal revolution of the earth, they first acquired by their separation that relative aspect, which qualified them to be *manifested together as the two great* *indices of annual and menstrual time*, but, for which manifestation, *both would not have been prepared on an earlier day*. And the *new* moon, being thus in the *third day of its revolution* (according to our vulgar computation), that is, of its *first quarter*, it would necessarily *appear at the setting of the sun*, and would thus be ready, *inchoare*, *ducere*, and therefore, *imperare noctem*—to *begin*, *lead on*, and so, *rule the night*. The *number* of the day, together with the senses of *αρχειν*—*inchoare et imperare*, tend thus reciprocally to support each other; and to shew, that the *first day of creation*, was both the *first day* of the *first year*, according to *solar* computation, and the *first day* of the *first month*, according to *lunar* computation. "The "astronomical characters distinguishing the *first* "*year* of the world from all others, which have "their *ratio* in the motions of the *sun* and *moon*, "(observes the learned Frank) are—3. that the "*moon* was in that conjunction with the *sun*, that "on the *fourth day*, when God brought forward "that planet, it appeared manifestly illuminated "after the setting of the sun, as is always the "case on the *fourth day after a new-moon;* and "from hence it follows, that the *novilunium* or "*new-moon* coincided with the *first day of Creation*[1]."

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[1] "Characteres astronomici quibus *annus mundi primus* ab aliis dis-"tinguitur, qui rationem suam in motu *solis* et *lunæ* habent, sunt—3.) "ut luna cum sole tali conjunctione fuerit, ut *quarto die*, quo Deus hoc "sidus produxit, post occasum solis plane illuminata apparuerit, id quod

The *light* which caused the *first three* days, and the *light* which caused the *last three* days, of the *Hexaëmeron*, being thus easily and naturally referrible to *one and the same cause*, it is unphilosophical, unreasonable, and unlearned, to assign them to *distinct* and *different causes*. It is *unphilosophical*, because it is contrary to those rules of universal science which enjoin, 1. "*not to admit* "*more causes of natural things than are sufficient* "*to explain their phenomena*; 2. *to assign, as* "*far as it can be done, the same cause to natural* "*effects of the same kind.*" It is *unreasonable*, because we know of no other light in the creation, besides that of the *sun*, to which we can ascribe *the light of day*; and, because we are not any where informed, that God has caused to cease any *mode of light* which he had previously ordained. And it is, moreover, *unlearned*; because, it betrays an ignorance of that which moderate learning of the subject would have imparted, *viz.* that the supposition of *two different causes of light* was a *late unskilful hypothesis*, unknown to the fellow-countrymen of the historian, who understood him to record *only one cause.* "According to the opinions of the *Latins and* "*Greeks*, observes the learned Hebraist Vata-

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"demum quarto die post novilunium evenire solet; atque hinc *novi-* "*lunium* cum *primo die creationis* coincidisse sequitur." (*Chronologia Fundamentalis*, &c. p. 39, 40.) I shall have occasion to speak again of this laborious and valuable chronologist, in the 9th Chapter of this Second Part.

"blus[1], the *sun* was created on the *fourth day;* "but, the *Hebrews* say, that both the *sun* and "*moon* were created on the *first day:* they "understand the *first light* to be that of the "*sun,* because the sun is the *source and fountain* "*of all light.*—Juxta *Latinorum et Græcorum* "opinionem sol *quarto* die creatus est; *Hebræi* "verò dicunt solem et lunam creatos fuisse *primo* "die: *Hebræi,* solis fuisse (primam) lucem intel-"ligunt, quòd *sol sit fons et origo lucis*[2]." When, therefore, we consider the state of *criticism* among those Greek and Latin Christians who first took upon themselves to set aside the prescriptive

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[1] "VATABLE, professeur de la langue Hébraïque, florissoit sous le "règne de Francois I. Il avoit une si grande connoissance de la langue "Hébraïque, que les Juifs même, qui assistoient souvent à ses leçons "publiques, ne le pouvoient assez admirer." — *Dict. de* MORERI. Amst. 1702.

[2] *Critici Sacri,* in Gen. i. 3 and 14. It is with no common surprise, that I find a learned Critic thus arguing in a recent periodical Journal. "Certain it is, from the narrative itself,—that the first three days were "passed before the creation of the sun *is mentioned;* and *yet* in these, "no less than in the others, the portion of time is denoted by the "words '*evening and morning,*' which, according to their received "import, *necessarily suppose the existence of the sun.*" (*Quarterly Review,* No. lvii. p. 163.) Now, the sound inference from the case, as thus stated by the learned Reviewer himself, is assuredly that which the ancient Hebrews drew—that the creation of the sun on the first day, though not *mentioned* by the historian, is *necessarily implied* by his narration. But, the Reviewer would draw from it the later *popular* inference—that we are therefore "not to understand the word *day* in the first chapter of Genesis "precisely in the same sense it now bears, viz. the period of the earth's "rotation on its own axis." The truth is, that *this question pertains to a branch of biblical criticism which has been almost entirely overlooked amongst Us.*

Hebrew acceptation of this article of the record; we cannot but wonder, that their innovation should have so long maintained the authority which it still holds amongst us. It is singular, that a former learned expositor, who adduces the ancient *Hebrew interpretation*, at the same time rejects it; alleging, as the motive of his rejection, the principle which of all others was that which ought to have induced him to embrace it, namely, *simplicity of interpretation*. "Some of the Rabbins," says he, "understand that *first light* to have been *the* "*light of the sun*, and, that the sun is *therefore* "said to have been created on the *fourth day*, "because it then *exercised its influence for the first* "*time on vegetation*; but, to *me* it appears more "consonant to the *simplicity* of the Scripture "to suppose, that the *light* which was created "on the *first* day, was *different* from that of "the *sun* which was produced on the *fourth* "day."—"Nonnulli ex Rabbinis, ut testatur Manasses, volunt lucem hanc fuisse *lucem solis*, "ac solem ideo dici quarto die creatum, quia "*tunc virtutem suam exercuit in plantis; mihi* "autem *simplicitati* Scripturæ accommodatius "videtur, lucem primo die creatam, à luce solis, "qui quarto die factus est, fuisse *diversam*[1]." We might venture to affirm; that this learned critic would have changed his notion of *simplicity*, and would not have found it in *difference* rather than in *unity and identity*, if he could have lived to witness the revolution in the sciences perfected in Newton, and to reflect upon his *Regulæ Philosophandi*[1]. It is true, that Philo, amongst his other *allegories*, allegorised also the *first light*, so as to render it something distinct from the sun; but then, he did not consider it as a part of the *material* creation. Josephus, does not distinctly shew his opinion; further, than that he assigns the production of light to the *first* day, and the ordination of the heavenly bodies to their respective functions, to the *fourth* day. "On "the *fourth* day (says he), God decorated the "heaven with the sun, and moon, and the other "luminaries; assigning to them motions and "courses by which the revolutions of times and "seasons might be *manifestly marked out*"—ὡρων περιφοραι φανεραι σημαινοιντο[2].

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[1] *Critici Sacri*, in Gen. i. 14.

But, a critical and philosophical consideration of the recital of the sacred historian, added to the remarkable coincidence, of the day of the moon's first natural appearance in her orbit with the day assigned for her first assuming the presidency of the night in the *Hexaëmeron*, confirms the interpretation founded upon *optical description;* which Rosenmuller has thus judiciously enforced.

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[1] On revising my references in order to this new edition, I find that this passage, which the immediate contiguity of the two commentaries in the *Critici Sacri* had led me inadvertantly to assign to Grotius, does not pertain to that great scholar, but to a learned English contemporary; of whom Beza thus wrote—"Here is your countryman *Thomas Cart-* "*wright*, than whom I think the sun does not behold a more learned "man."

[2] *Antiq. Jud.* lib. i. cap. 2.

" This exposition, (adds this learned commen-
" tator,) which is perfectly conformable to the
" genius of the Hebrew tongue, removes all
" difficulties; and it is surprising that this pas-
" sage of the history, which alone opens a way
" to a true interpretation, should have led inter-
" preters astray in every direction, and have
" given origin to so many monstrous *hypotheses.*
" For, any one who will read this passage atten-
" tively, and without any previous bias of his judg-
" ment, must perceive; that Moses presupposes,
" as a certain and unquestioned truth, that the
" heavenly bodies *were already in existence,* but
" that they *now began,* by the will of the Creator,
" *to exercise those offices towards the earth which*
" *they still exercise;* and I doubt, if any one of
" the *Israelites* understood Moses in any other
" sense[1].—And it would be absurd for any one
" here to object, that the sacred Scriptures thus
" lead men into error; this objection could have
" no weight, unless it was the design of those
" Scriptures to instruct mankind in *astronomy;*
" which no one will readily suppose[2]."

In truth, that the fourth day only *rendered visible* the sidereal creations of the first day, is manifested by collating the transactions of the two days. On the *first day,* we are told generally, that " God divided the light or day, and " the darkness or night;" but, the *physical agents* which He employed for that division are not there declared. On the *fourth day,* we are told referentially, " God commanded *the lights* (*or luminaries*) *for dividing day and night,* to give their " light upon the earth." Here then it is evident, from the *retrospective implication* of the latter description, that the lights or luminaries *for dividing day and night,* which were to *give their light upon the earth* for the first time on the *fourth day,* were the unexpressed *physical agents* by which God divided the day and night on the *first day.*

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[1] Page 64. [2] Page 63.

III. 1. The only error of the learned German commentator in this article, results from the *hypothesis* before mentioned[1]; into which he suffered himself to be seduced, and by which he deprived himself of the full benefit of his own lucid principle of interpretation. By the *artificial interval of time* which he forced into the record; confessedly without any authority from the *text,* (for he knew not where to place it,) but solely in compliance with the requisition of *the mineral geology;* he deserted the guidance of his own principle. Having once fatally admitted that false and indefinite interval, he was at a loss to assign the *particular physical character* which distinguished the *fourth day;* and he asked, " *What was done* on " this day, if we look for the *physical truth?* for, " we have hitherto only followed Moses with

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[1] See above, p. 191, 192.

"relation to the *optical truth*—*Quid* hoc die *sit* "*factum*, si secundum *veritatem physicam* res "consideretur? hactenus enim secundum *veri-* "*tatem opticam*, Mosen ducem secuti, rem consi- "deravimus[1]."

He failed to perceive the *true origin of the world* at the point of time which the record declares, and he therefore was unable to trace the simplicity and order of the progress of creation from thence to the *fourth day;* and, having thus left himself without the aids both of *reason* and *criticism* to determine the question, he resorted to the dubious and fanciful conjecture; "*either*, that the earth then received its "first impulse in its *orbit*, having before only re- "volved upon its *axis;* or, *that the moon was then* "*first made a satellite of this earth.*" In the latter of these alternatives, he was not very far from the truth. But, if he had given himself time to discover how unwarranted were those demands of the mineral geology to which he paid such hasty submission, and that the text needed not, but protested against, the breach which he made in it to satisfy those unwarranted demands; he would have traced the progress of creation during the first three days, in the order related by the historian, and would have found, that the *first manifestation of the heavenly luminaries*, and the *first appearance of the moon* by the operation of the new planetary laws on the *fourth day* of its revolution, fully reveal the *physical fact* which distinguished this particular day of the *Hexaëmeron.*

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[1] Page 65.

2. The errors of De Luc in this question, are of a much graver and more reprehensible nature. In his pernicious scheme of *compromise* and *concession,* he has the temerity to discourse thus upon this article: "The operations which took place, " between the great epocha of the *creation of light,* " and the *origin of man,* recited in the first chapter " of Genesis, are there divided into *six periods,* " called *days* in our translation; and it is upon " the *undefined interpretation* of this word *day,* that " *unbelievers* have founded their *most specious* at- " tacks against revelation. For it was *easy,* with " only a *very slight knowledge of geology,* to oppose " *many phenomena* to a succession of such events " in the compass of *six of our days of twenty-four* " *hours.* But, it is *evident from the text itself* that " this interpretation is *erroneous;* for it is *obvious,* " that days of twenty-four hours are measured " by revolutions of the earth *in the presence of the* " *sun illuminating it,* whereas the sun does not " *appear in this recital* until the *fourth* of the days " in question: *consequently — par conséquent —* " these *are not days of twenty-four hours,* but " *periods of undetermined length.* And for a long " time *ancient interpreters* have remarked, that the " *same word* of the text is employed in *this latter* " *sense* in other parts of *Genesis,* where the word " *morning* denotes the *beginning,* and the word " *evening* the *end,* of *some period.* This is the *only*

" *manner in which* WE *can understand that de-*
" *scription of each of those days*—' and the evening
' and the morning were the first day:' and
" the same of all the others. For, as the interval
" between *evening* and *morning* is only a part of a
" day of twenty-four hours, and not one of those
" days complete, whereas the beginning and end
" of a *period* render it complete; WE *see clearly, by*
" *this difference, what* MUST *be the sense of the words*
" *employed here by Moses.* This is the *only remark*
" which I have to make upon *the text*[1]."

It is difficult to give a name to this attempt, to dogmatise in *scriptural interpretation* in total destitution even of the elements of the *learning* by which alone it can be either confirmed or confuted. For, there is no *tiro* in biblical learning who does not know, that it is utterly *untrue* that the Hebrew ערב, signifying *evening*, and בקר, signifying *morning*, are used in any one instance, in any one part of the book of Genesis, to signify the beginning and end of a *period of undetermined length;* as De Luc here asserts, with an hardihood totally unaccountable: that it is utterly *untrue*, that " *ancient* " interpreters have for a long time remarked— " depuis long-tems les interprêtes *antiques* ont " remarqué"—any such thing: and, that it is equally *untrue*, that the word יום—*day*, is any where employed by Moses, or by any other sacred writer, with the latitude which he here endeavours to affix to it, not by any rule or sufferance of the language, but, merely *to carry, by force or stratagem, a point of system.* By such a mode of interpretation, any thing may be converted into every thing; and it would therefore be far more reasonable and more ingenious to deny the record altogether, than thus to strive to compel it to *falsify itself.*

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[1] *Lettres Géologiques*, p. 95—97.

The snare which drew him into this dangerous experiment, was the popular assumption, of the *certainty* of the interpretation which ascribed the *creation of the sun to the fourth day,* merely because the sun "does not *appear in the recital,*" that is, is not *mentioned in the recital,* until that day; under a total ignorance that there existed any sufficient evidence to shew, that the popular assumption was wholly erroneous. Yet, upon this single unskilful foundation, he ventured to raise the whole of that first stage of his geology which respects *the* MODE *of the first formation* of this habitable globe; and which he has confidently presented, as a *confirmation of the Mosaic veracity:* thus, taking a conspicuous lead among those philosophers of whom Rosenmuller well observed: "eo delapsi sunt, ut *systemata recentiorum physicorum* in Mose quærerent, et verba *misere* ad "opiniones suas præconceptas *detorquerent*[1]." But, let it only be shewn (as it has been shewn,) upon sound principles of critical interpretation and of Newtonian philosophy, that it is *more pro-*

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[1] Page 14. See above, p. 163.

bable that the light of the *first* day was derived from the *same* identical cause as the light of the *fourth* day, than that it was a *latent chemical principle* (as he would propound,) unknown to all mankind until the improved chemistry of the eighteenth Christian century discovered it in a laboratory at Paris; and the whole of his "*Lettres* "*Géologiques*" becomes at once waste paper, and exists only as a type of that "*confused assemblage* "*of elements*" from which he would derive the order and arrangement of this globe.

And, what is the *motive* which he sets forth, to allure our *will* to his fantastical interpretation? for, it is not our *reason* that he addresses, but our *will*. It is, to *conciliate unbelievers*. To conciliate unbelievers, by supplying them with every needful means of light for discerning the truths which they do not apprehend, or recognise, is doubtless a high moral and Christian duty; but, to strive to conciliate them by a *surrender* of any particle of those truths, to modify or *change* them, to cut and *fashion* them to the measure and mode of their *disposition to conviction*, is not *liberality*, but a *breach of trust* of the same kind as to bid our master's debtor "*take his* "*bill, and write down fifty measures of wheat*," when we are well aware, that "*an hundred measures*" is the true amount of the score. We are not intrusted with any *discretionary power*, for thus negotiating the good will of infidelity in the article of *revealed truth*; and therefore, we may not exercise it. We must take care to present that truth pure and genuine, and unbelievers must then *take it as it is*, or they must *leave it;* but, those who attempt a compromise by any *unauthorised concession*, are not the champions, but the deserters of that truth: *non tali auxilio*[1], &c! The Levitical law prescribed—"thou shalt "not plow with *an ox and an ass together;*" in exposition of which symbolical law, St. Paul enjoined—"be not *unequally yoked:*—what com-"munion hath *light* with *darkness?*" To attempt to geologise with the Mosaical and Mineral geologies in *conjugation*, is plainly to attempt the communion of light with darkness.

It is not without sincere pain, that I feel myself compelled thus strongly to censure this particular work of the able and amiable De Luc; but, in so sacred a cause, there may be no complimentary reservation from man to man. He has rendered it indispensably necessary, that a strong and effectual caution should accompany his writings; because, they tend to dissolve the foundations of the edifice which they officiously offer to secure. They are calculated, therefore, to produce an evil which no hostile assault could effect; for, they are calculated to attract a confidence, which an hostile demonstration would repel[1]. De Luc designed friendship; but, unfortunately, the execution of his friendly design is real hostility. He was eminently distinguished, and his memory will ever be deservedly honoured, in the department of *physics;* he was great also, in shewing the concord of many *natural phenomena* with the Mosaic record of *the deluge;* but, there was the *limit* of his *true geology.* As soon as he attempted to proceed further, and to argue *the* MODE *of the first formations of this globe,* his mind lost its guide; he had strayed *ultra crepidam;* and he brought himself into the same predicament with those, whom he had before refuted and condemned in the article of *the deluge*. The *measures of time* which he had philosophically denied to them, he now unphilosophically and inconsistently demanded for himself: *they* could not explain the *revolution* of this earthly system, without the aid of exorbitant measures of time which the Mosaical record refused them; and *he himself* could not *understand* the Mosaical description of the *creation* of this system, without exacting measures equally exorbitant, and equally refused by the record. The natural *days* distinctly asserted by Moses, were therefore to be arbitrarily changed into such successive *periods of time* as, in his calculation, would allow of a chemical precipitation and crystallisation of this globe; the *evenings* and the *mornings* of those days, were to be perverted into the beginnings and endings of those imagined periods; and, the *light* of the *first day* was to be transformed into an *universal chemical substance*, "*not proceeding from any luminous body, like the* "*sun*, but, intermixed with the mass of terrene "elements; in order, 1. to penetrate that mass;

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[1] Of the peculiarly unfortunate turn of this estimable person's mind, as a *professed defender of revelation*, a competent sample is afforded in the following note; which he subjoins to his assertion, that "we read of "no miracle in which there was any *new creation.*"—"The *multipli-"cation of loaves*, (says he,) will perhaps be objected to me; and I "shall certainly not do what I disapprove of in many divines—reply by "an explanation. *But, it is easy to conceive that this provision of bread "might come there in many different ways;* not indeed without a *miracle*, "but without a *new creation.*"—(*Lettres sur l'Hist. de la Terre*, tom. i. p. 236, *note.*) He does not impart his conceptions to his reader, because he thinks they are so easy of apprehension. But, would he have found the same facility in *conceiving the manner* in which the *barrel of meal*, and the *cruse of oil*, supplied the widow of Sarepta, *without any waste of their quantities?* The same may be urged of numerous miracles recorded in both Testaments. Until we can comprehend the *essence* of matter, it is as unphilosophical as it is impious to dogmatise on the laws of its creation. There was *another course*, besides that which he rejected and that which he adopted; which was, not to attempt an *easy conception* of what *cannot be conceived.* It is this *easy conception of first formations*, which has engendered the monstrous system of the *modern chaotic geology.*—See above, p. 100, 101.

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[1] "Buffon also (it is said) in the results which were continually "arising from his endless investigations into natural history, *declares,* "that he discovered *no inconsistency* between those phenomena and the "statements of the Mosaic record." (*Vindic. Geol.* p. 27.) To draw any conclusion, however, from that *declaration,* without knowing Buffon's view of those statements, would be a grievous self-delusion. The pretended exposition of these, in his "*Theory of the Earth,*" is not merely a perversion but a contradiction of them; serving only to mask the contradiction, by pretending submission to their authority. Nothing can be

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more injurious to the *Sacred Text*, than to cite its perverters as its defenders. It behoves, that the line of distinction be broadly marked between the two. Buffon wrote, subject to *censorian restraint;* and he could only promulgate his hypothetical contradiction of the Mosaic statements, by professing conformity to them. His declaration, therefore, comprehends this implied condition — provided the statements of the Mosaic record be interpreted in conformity to his inventive "*Theory*," which presupposes the *earth* to have been knocked off from the *solar orb*. See above, p. 187, note 3.

" 2. to produce *fire*, by its union with *a particular* " *element;* 3. to cause the liquefaction of *water* by " its union with fire; and lastly, to effect *dif-* " *ferent* chemical combinations of light with the " other elements[1]." All this was to be done; not because the text of Moses stood in any need of these fantastical contrivances, but, " *because* (says " De Luc) *it is the only manner in which* WE CAN " UNDERSTAND *the Mosaic description of those days*." And therefore, because the mode illustrated by this obscurity is the only mode in which WE can understand it, the text of Moses is to be interpreted by no other rule than *our incapacity to understand it;* although that incapacity proceeds, solely and entirely, from our deficiency in the knowledge requisite for understanding it. Let this principle be applied to any other object of research, and its *absurdity* will be at once manifest; to say nothing of its necessary consequence, with respect to *truth*. " *Take heed, that the* LIGHT *that is in thee be not* " DARKNESS;" is a caution, which the mineral system of geology would do well to apply to its own science[2].

Dolomieu acutely remarked to De Luc; " that though *light* might produce *fire*, and fire

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[1] *Lettres Géologiques*, p. 101, &c.

[2] I am bound to acknowledge, that the force of these strictures is in a great degree diverted from this eminent *naturalist*, since a learned *professed biblical expositor*, subsequently to the publication of the first edition of this work, has adventured to promulgate an interpretation equally latitudinarian, and equally indefensible. See Note [I.] *On the Mosaic Days of Creation*.

" *water*, yet no progress would thereby be made " in the problem to be solved; because, the " simple *liquidity* of water would be *inoperative*, " without the accession of some *principle of activity which does not essentially pertain to it*[1]." To this forcible objection, which paralysed the *primum mobile of his chemical chaos*, De Luc replied by promising an answer in some *future work*[2]*:* so sturdily did he now stickle for *time*.

Time, is the great fascinator not only of all unbelievers, but of all semi-believers, and conditional and systematical believers; and equally sagacious, are the various ways in which they strive to extend it. Professor Meinars argued the *length of time* which must have been necessary for the *gradual discovery* of the great truth, of a *One, Supreme, Creator and Governor of the world*. But, by the *more philosophical supposition*, which the Mosaic record confirms—that the *Intelligent Creator* endowed His *intelligent creature* with the knowledge of that great truth at his first formation, in order to render him " *conducive to the end for which he* " *formed him*"—those unnecessary and unphilosophical measures are at once abscinded from the true computation of time. The same error has sought the same measures, in imagining the *time* requisite for making and collecting the various *observations* by which man could arrive at an accurate knowledge of the principal *heavenly bodies,* their *movements* and *indications,* so as to be able to apply them familiarly to the *computation of time.* Hence, the learned and unfortunate Bailly's errant and indefatigable chase after his *obliterated people;* to whom, he was persuaded, we ought to attribute the *first discovery* of these great points so essential to the existence of civilised man, and whose traces he imagined he had at last detected, "*in Iceland, Greenland, Spitzbergen, and Nova* "*Zembla—when the interior heat of the earth was* "*greater, and had a greater influence relatively to* "*that of the sun, so as to maintain the perpetual spring* "*regretted by all poets:*" in which happy regions he placed the *Atlantic Island* of Solon[1]. But, the same *philosophical principle* will dispel the illusive error in this case, as in the former; and the Mosaical record expressly assures us, in the article we have been now considering, that the Creator, on this *fourth day*, disposed His celestial calendar in its first sensible and complete order of indications relative to this earth, and appointed it "*to* "BE *for* SIGNS, *and for* SEASONS, *and for* DAYS "*and* YEARS;" preparatory to the proximate *creation of* MAN, to whom it was to be *imparted by Him*, and for whom *alone* He designed it to be *conducive to those relative ends*.

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[1] *Lettres Géologiques*, p. 95, *note*.

[2] " Les objections d'un Physicien tel que M. de Dolomieu, qui " jamais ne sont futiles, exigent des discussions directes, et je m'acquit- " terai de ce devoir dans *un autre ouvrage*." (Ib.)—Why lose the *present opportunity*, if the answer to the objection was *ready at hand?*

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[1] *Lettres sur l'Atlantide, &c. adressées à M. de Voltaire,* p. 384, 398. "L'Islande, le Greenland, le Spitzberg, et la Nouvelle Zemble.— "Lorsque la chaleur intérieure de la terre était plus grande, lorsqu'elle "avait plus d'avantage sur la chaleur du soleil, la température était "moins variable; et l'on peut *se faire une idée* de ce printems perpétuel, "que les poëtes regrettent encore dans leurs vers."—"I do not dispute "against *you,* (said Voltaire) I only endeavour to *inform myself.* I am "an old *blind man,* who desires *you to shew him the way*—je ne dispute "point contre *vous,* je ne cherche qu'à *m'instruire.* Je suis un vieil "*aveugle,* qui *vous demande le chemin.*" (Ib. p. 1.) But, "*if the blind* "*lead the blind, they shall both fall into the ditch.*"—"I have not the "presumption (rejoined Baïlly) to teach *you* any thing in history and "philosophy—I shall plead my cause before *you,* and, in *seeking for* "*light,* I shall only present you the conclusions for *your judgment*—je "n'ai pas la présomption, Monsieur, de vous rien apprendre en histoire "et en philosophie;—je vais plaider devant *vous*—et en *cherchant la* "*lumière,* je ne vous adresserai que les conclusions *pour les juger.*"

Thus, then, it is sufficiently manifest, from the concurring authorities of *learning* and *philosophy;* that the *solar light*, which, upon the *fourth* day of creation, was transmitted *immediately* and *optically* from the solar orb, was the *same light* that, during the three preceding days, had been transmitted through a *nebulous medium* interposed between it

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(p. 23, 24.) In this fulsome manner, did the *French philosophy of the eighteenth century* bandy its mutual compliments of insincerity. It may be useful to cite, from the same work, the more instructive words of its estimable but misguided author; written in 1778, and addressed to the same Coryphæus of Infidelity. "Ne souhaitons jamais de *révolution*, plaignons "nos pères de celles qu'ils ont éprouvées. Le bien dans la nature physique et morale ne descend du ciel sur nous que lentement, peu-à-peu, "j'ai presque dit goutte à goutte; mais ce qui est *subit*, *instantané*, "tout ce qui est *révolution*, est une source de maux." (p. 21.) Little did he suspect, when he recorded this wise sentence, that a *revolution* such as he deprecated was in actual but secret preparation around him; fomented principally by that infidelity, pure or modified, which arrogated to itself the title of *philosophy*, and whose cause he was unconsciously serving; and which would hurry him to the scaffold, amongst its earliest victims.

and the earth: μητε ἡλιου, μητε αστρων επιφαινοντων —"*neither sun nor stars having been apparent*," during that covered and clouded period[1]. And thus, "the *evening* and the *morning*," with the luminaries for dividing day and night *manifested in the heaven and giving their light upon the earth*, accomplished the *Fourth Day*.

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[1] Involvere diem nimbi, et nox humida cœlum
Abstulit.
Tres adeo *incertos cæca caligine soles*
Erramus pelago, totidem *sine sidere noctes*.
Æn. iii. 203.

CHAPTER VII.

The sacred historian goes on to his *Fifth Article*, and relates:

“ *And* God *said, Let the waters bring forth*
“ *abundantly the moving creature that hath life, and*
“ *fowl that may fly above the earth in the open fir-*
“ *mament of heaven.*

“ *And* God *created* GREAT WHALES, *and every*
“ *living creature that moveth, which the waters*
“ *brought forth abundantly after their kind; and*
“ *every winged fowl after its kind. And* God
“ *saw that it was good.*

“ *And* God *blessed them, saying: Be fruitful*
“ *and multiply, and* FILL THE WATERS IN THE
“ SEAS; *and let fowl multiply in the earth.*

“ *And the evening and the morning were the*
“ FIFTH DAY.”

The word ישרצו, which our version renders “ *bring forth abundantly,*” is rendered by the Greek interpreters, εξαγαγετο, which simply expresses “ *bring forth,*” without the qualification of “ *abundantly.*” The same qualification is absent also in the Latin version of the Chaldee paraphrase. Yet, the Hebrew verb implies abundance; its proper sense being that of *scaturivit,*

i. e. *progenuit abundè*, as it is rendered by Castell; i. e. to *breed*, or *produce abundantly*.

In this article is related, the *first formation of animal matter* by the *immediate act* of Almighty Power, i. e. *by Creation: a mode of formation*, which appears to constitute the great *tormentum* of the mineral geology; from the constraint of which, it is ever labouring to extricate its science; but from which, nevertheless, it can never emancipate it. This amazing operation, it sometimes states thus: "au bout d'un certain tems, ce "liquide *fut peuplé d'animaux*[1]—at the end of a "certain time, this (*chemical*) liquid *was peopled* "*with animals*;" it does not tell us *how*, but observes, "c'est un *trop grand sujet*[2]—this is *too* "*great a subject* to treat summarily," in order to maintain its spurious distinction between the MODES *of mineral and of animal first formations.* Yet, the subject is *no greater* in the one case than in the other, being exactly *commensurate* in both. Sometimes it shelters itself, from the assertion of *creation*, in the allegation of *development;* and propounds, with anodyne obscurity, "*the develop-* "*ment of organic life on the globe*[3]." Nor does it seem to be so much amazed that the globe was *peopled at all*, as that it was *not peopled sooner:* "What is *astonishing*, it says, and not less cer- "tain, is, that *life has not always existed on the*

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[1] DE LUC, *Lett. Géol.* p. 77.

[2] Ibid. p. 220.

[3] HUMBOLDT, *Superp. of Rocks*, p. 28, 30, 46.

"*globe*[1]." It is difficult, to understand the ground of its astonishment; for, if it supposes the earth to have had a *beginning*, the production of animals on the *fifth day* of its formation, was early enough to have satisfied it.

The same *immediate operation* of God, which, on the *first* day, gave perfect existence to His *mineral* system, and, on the *third* day, to His *vegetable* system; gave perfect existence, on this *fifth* day, to that first created part of His *animal* system, which comprehended every kind of *marine* and *winged* animal, in all the individuals pertaining to its *first formation.* These were *formed in full maturity of structure,* in all their component parts, by a mode disclaiming all secondary operation. And, though the bones of the first "*whales*" unquestionably bore the *appearance* of an *ossifying process,* as the textures of the first *rock* and of the first *tree* severally bore the appearances of a *crystallising* and of a *lignifying* process, yet, that appearance was no indication to *reason* that they were produced by such a process; because, reason perceives, that they acquired their *ossified substance* and *phenomena* before any *process of ossification* had begun to take place.

Thus, *marine animals* of every kind, from the largest to the minutest, were produced "*in abundance*" in the *sea-bed* into which the general mass of the waters had been drawn from off the portion of the globe invested with vegetation; which *sea-bed*, had been formed by the *disruption* and *subsidence* of the other portion of the globe. Let us, therefore, carry our thoughts again into the *structure of that bed*, and into its apparently disordered and ruinous depths and recesses; I say *apparently* disordered, because, the circumstances of its mysterious *alteration* were as much directed to *final purposes*, by the Divine Wisdom, as the regularity of its *first formation*. The mineral materials, which retained their primitive order and position in the *undisturbed dry land*, were here fractured, severed, dispersed, and in various ways disturbed, and the soils, which had at first rested on their rocky bases, were necessarily displaced by the rupture of those bases; and, being precipitated into the *new profundity*, together with the innumerable fragments of the broken rocks, formed the slimy or the shingly *bottom of the new sea*. On that *bottom*, and in all the varieties of its parts, whether in its lowest depths or upon the submerged masses which lay upon it, *marine matter* of every kind, vegetable and animal, was produced in abundance, with the power of perpetual reproduction; and it continued to increase in quantity, in a multiple ratio, during a succession of many ages. This is a FACT, of fundamental concernment to TRUE GEOLOGY; and it will therefore behove the reader to engrave it deeply, and to retain it fixedly in his mind, until the

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[1] CUVIER, *Disc. Prél.* p. 9.—Th. § 6. "Ce qui *étonne,* et ce qui n'est "pas moins certain, c'est *que la vie n'a pas toujours existé sur le globe.*"

sequel of our argument shall cause us to *return to it*, under a new and a still more interesting aspect.

Thus, with the first created portion of the *animal kingdom*, the evening and the morning completed the *Fifth Day*.

CHAPTER VIII.

THE historian at length arrives at his *Sixth Article;* which is the *last,* in the history of the *Creation* of the constituent parts of this earthly system.

" *And* GOD *said; Let the earth bring forth the*
" *living creature after its kind, cattle and creeping*
" *thing, and beast of the earth after its kind. And*
" *it was so.*

" *And* GOD *made the beast of the earth after its*
" *kind, the cattle after their kind, and every thing*
" *that creepeth on the earth after its kind. And*
" GOD *saw that it was good.*

◆

" *And* GOD *said; Let us make* MAN *in* OUR
" IMAGE, *after* OUR LIKENESS ; *and let them have*
" DOMINION *over the fish of the sea, and over*
" *the fowl of the air, and over the cattle, and over*
" *all the earth, and over every creeping thing that*
" *moveth upon the earth.*

" *So* GOD *created* MAN *in* HIS OWN IMAGE,
" *in the* IMAGE OF GOD *created He him : male and*
" *female created He them.*

" *And* GOD *blessed them, and* GOD *said unto*
" *them, Be fruitful and multiply, and replenish the*
" *earth, and subdue it: and* HAVE DOMINION *over*

“ *the fish of the sea, and over the fowl of the air, and*
“ *over every living thing that moveth upon the earth.*

“ *And* GOD *said; Behold, I have given you*
“ *every herb bearing seed, which is upon the face*
“ *all the earth, and every tree in the which is the*
“ *fruit of a tree yielding seed, to you it shall be for*
“ *meat; and to every beast of the earth, and to every*
“ *fowl of the air, and to every thing that moveth*
“ *upon the earth wherein there is life, every green*
“ *herb for meat. And it was so.*

“ *And* GOD *saw every thing that* HE HAD
“ MADE, *and behold it was* VERY GOOD.

“ *And the evening and the morning were the*
“ SIXTH DAY.”

The creation of MAN “ *in the image and likeness of* GOD”—*κατ' εικονα και καθ' ὁμοιωσιν Θεου*, relates, and can only relate, to the *intellectual, moral,* and *immortal nature* with which the infinite goodness of God was pleased to invest him; these are the only points of his nature, in which the most distant analogy can be traced to the nature of his infinite CREATOR. And, the “ DOMINION” with which God was further pleased to endow him “ *over all the earth*” which He had now completed, shewed, *that all that terrestrial creation was designed to be subordinate to the* END *for which He had placed within it that* INTELLECTUAL, MORAL, *and* IMMORTAL BEING.

In this concluding article of creation, we are instructed; *first,* that this *sixth* day was marked by a vast enlargement of the sphere of *animal matter*, completing the universal animal system, by the formation of every kind of animated being which was to inhabit and occupy the surface of the earth now provided with every variety of vegetable production. But, we are informed *secondly*, that the *last animal structure* of this creation, was that which God on this same day assigned to MAN, and into which He "*breathed a* LIVING SOUL;" uniting in his being, both a nature which bore analogy to *His own divine nature*, and a frame analogous, in its general laws, to the *animal natures of the earth*, though furnished with many excellencies above them; of which, the faculty of *speech*, for communicating intelligence, and the conformation of the *hands*, for executing the purposes of intelligence, are chief and pre-eminent. Thus MAN, by his *animal nature*, was linked to the system of *this globe;* but, by his *moral nature*, and by the *unperishing essence* of that nature, he demonstrated a disparity to that system, and a relation to a *different and a far more exalted sphere*[1]. This *mineral globe*, was formed and assigned for the *temporary theatre* of his being, and with the purpose of sustaining and serving the *animal* and *vegetable* systems; but chiefly, to supply the necessities of the HUMAN RESIDENT, and to exercise the various powers, *moral* and *physical*, with which his *mind* and his *frame* were severally endowed. To *him*, therefore, the Creator was pleased to assign the "DOMINION" over His new-created earth. With this last article in the "*history of Creation*," commences the "*history of Man*," in the Book of Revelation. In this *latter* history, it is indeed true, that the historian "*confines his details to Man, and* "*to the dealings of Divine Providence in regard to him;*" but, we have had full demonstration in the preceding pages, how remote from the fact is the position, that in the *former history also* the historian confines his details to the same object, and "*passes* "*over in silence the operations antecedent to the crea-* "*tion of animals and vegetables:*" for, Man is the *last and terminating subject* in that first pregnant and comprehensive history, of the *Creation and primitive ordination of our Globe.*

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[1] A conscious sense of this great and indelible truth, prompted the ingenuous, but imperfect statement of the heathen historian: "Nostra "omnis vis in *animo* et *corpore* sita est: animi *imperio*, corporis *servitio* "magis utimur: alterum nobis cum *Dîs*, alterum cum *belluis* commune "est."—SALLUST, *Proœm.*

And here, in considering this *first article* in the *history of Man*, it will be specially expedient to notice the effect continually resulting from the practice to which I have already adverted[1], of pursuing *physics* as a branch of science complete in itself, and not necessarily requiring an association with *morals*: a practice, common among those who are immersed in the studies of the *natural sciences*, who appear to conduct them under a jealousy of morals, and under a settled principle, that the spheres of the two philosophies are entirely distinct and independent of each other; so that any interference of *morals* in the sphere of *physics*, is an usurpation, and an infringement of the rights of the latter. By this melancholy estrangement, the due and natural subordination of the latter to the former, which Newton inculcated and which right reason asserts, becomes in a great degree dissolved; and *physics*, confidently advancing alone in a state of misguidance, become sterilised of their noblest and richest fruits. This must be the case, when God is not habitually regarded as the *first physical principle*, as He was regarded by Newton; but only as the *first moral principle*, and therefore pertaining to quite another branch of mental contemplation. In this defective condition of the mind,

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[1] See above, p. 129, 130.

> "Tortive and errant from its course of growth,"

but which is fatally mistaken for direct and vigorous advancement, the *moral* feelings that are sometimes roused, and, as it were, mechanically compelled into action in the *physical contemplator* by the grandeur and sublimity of the objects which he witnesses, are vague, confused, and indigested; and the terms in which they are enounced, betray the crudity and imperfection of the conceptions from which they emanate. I shall illustrate the case to which I allude, by producing an example of this *semi-moral sentiment;* which, though it is common even to commonplace among *physical philosophers,* I particularly select, because it is the expression of one of the most able and most deservedly celebrated mineralogists of our time.

"If, in the midst of such meditations, (says "this eminent naturalist,) the idea of the *little* "*beings which crawl* upon the surface of this globe "presents itself to the mind; if it compares *their* "*duration* with the *great epochas of nature,* how "will it be *astonished,* that, occupying so *small a* "*place* both in *space and time,* they could believe "that they were the *sole end* of the creation and "of the universe?—It is *here* (he exclaims, "namely, on the summit of Ætna which inspired "these reflections,) that the *philosopher* ought to "build the *Temple of Wisdom;* to say, with the "*Chanter of Nature*[1],

> "*Suave mari magno, &c.*[2]"

i. e. '*Tis pleasant,* when the seas are rough, to stand
And see another's danger, safe at land.
Not 'cause he's troubled, but 'tis *sweet* to see
Those cares and fears from which *ourselves are free!*
CREECH.

It is not difficult to discern, from whence this *physico-moral* effusion springs, and whither it tends. And, indeed, how is it possible that the *philosopher* should entertain a persuasion, that the "DOMINION" over the vast theatre which he surveys from Ætna had been consigned in all formality by its Creator to the *little crawling beings* which he describes in the landscape below; whilst his *wisdom* is engaged in chanting with the *Chanter of Nature,* who only chanted that he might disclaim an *intelligent Creator and Constructor of that theatre?* Why the animated mineral geologist should have pitched upon the particular *stave* which he here selects for celebration, does not very clearly appear. That the adventurous *traveller,* who after much toil and hazard has reached a place of refuge upon the summit, should sing it, we might perhaps be able to comprehend; but, why the "*philosopher*" is to sing it, and especially in the "*Temple of Wisdom,*" I must protest, for one, I cannot in the least degree comprehend.

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[1] SAUSSURE, *Voyages dans les Alpes,* tom. i. *Disc. Prél.* p. 6, 7.

[2] LUCRETIUS, ii. 1.

There may possibly, however, appear to some minds, on the first perusal of this reflection, a mixed character of sublimity and humility, of profound thought, and of devout sentiment; but, upon a nearer inspection, and an accurate analysis, all those characters will dissolve and disappear. It may therefore not be amiss, to pursue the *analysis.*

Though the author uses the words *creation* and *universe,* yet it is evident from the context, that his mind intended no more by those terms than the *expanse of earth* exposed to his contemplation from the crests of the loftiest mountains; upon which, it is certain that the *spiritual affections* of the soul experience instinctively an *ascending* tendency, which is presently counteracted and depressed in the *sensitive affections*, by a consciousness of *weakness* and *inferiority*. The reflection conveys a censure upon all those who think, that the *little being* can be the *chief object*, with a view to which this earthly system of creation was *originally framed:* for, no one ever yet imagined, that he was the chief object of the *entire creation* and *unbounded universe;* and it founds that censure, exclusively, upon the relative *magnitudes* and *durations* of the *vast* features of the globe, and of the *small* human beings who inhabit, or as he expresses himself, who "*crawl*" upon it. Now, the vast magnitudes are *mountains*, and the small magnitudes are *men;* and it argues, that the disparity of those magnitudes and of their durations is so excessively great, that it is irrational and stupid to suppose, that the *larger* can be subservient to the ends of the *smaller*. But, if there is any sense or virtue in this reflection, it must consist in duly estimating the *relative importance* of the *two magnitudes and durations;* and, in concluding logically, the comparative insignificancy of *the smaller*. And it will then necessarily follow, that the insignificancy of the *smaller* would lessen, in the same proportion in which it might *increase in bulk*. If the little beings therefore were to be magnified in the proportions of 2, 3, 4, &c., their insignificancy, relatively to the great features of the globe, would necessarily diminish in the same ratio. The smaller the disproportion between the man and the mountain, the less would be the relative insignificance of the former; and although the increase of magnitude in the smaller object be ever so inconsiderable, yet, if it is *positive and real,* its dignity must be proportionately increased in the *true nature of things:* the *bigger* the being that crawls upon the surface of this globe, the *less absurd* would be the supposition that he is the final object of this terrestrial creation. The *Irish giant,* therefore, whose altitude exceeded the measure of *eight* feet, would exceed in relative dignity, by the same proportion, *Bacon* and *Newton,* whose height did not attain to *six* feet. The *Brobdignag,* would far excel the *Irish giant;* whilst, on the other hand, that diminutive race of illustrious men, which, by Lord Clarendon's relation, distinguished the unhappy times in which he lived[1], would sink into extreme insignificance, compared with a magnitude so considerable and respectable as that of the *Brobdignag.* If this is *nonsense,* then must that also be *nonsense* from which it is the genuine conclusion: viz. that the *material magnitudes* of the little beings, or their *duration* upon the earth on which they "*crawl,*" determines, in any manner, their importance in the creation, relatively to the primordial mountains which arise above it, or to the extent of the regions which may be surveyed from their summits. For, if the same *physically small* beings possess *another magnitude*, which can be brought to another and a different scale of computation from that of *physical* or *material magnitude;* a scale, infinitely surpassing in importance the greatest measures of that magnitude; then, there will be nothing irrational or surprising in the supposition, that the highest mountains, and the widest regions, and the entire system to which they pertain, may be entirely subservient to the *ends* of those smaller beings, and to that *other system* to which these pertain; which latter, will thus be found superior in importance to the former. Such a scale is that, by which the *intelligent, moral,* and *immortal* nature of MAN is to be measured, and which the sacred historian calls, a formation "*after the image and* "*likeness of* GOD:" a scale, so little taken into the contemplation of the science of *mere physics.* As soon, however, as that *moral* scale of magnitude once supersedes the *physical* scale in the apprehension of the mind; as soon as the mind perceives, that the *duration* of that intelligent moral nature infinitely exceeds any "*epocha of Nature*" which the most vigorous imagination of the mineral geology can represent to itself; and that, though the *physical* nature of man is limited to a very small measure of time, yet his *moral* nature is unlimited in time, and will *outlast all the mountains of the globe;* it then at once perceives the counterfeit quality of the philosophy, which at first appeared so sublime and so humble, so profound and so devout.

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[1] *Life,* p. 28, fol.—*Lord Falkland, Hales, Chillingworth,* &c.

“ —— Say, know'st thou *what thou art?*
“ Know'st thou th' *importance of a soul immortal?*
“ Behold this midnight glory! worlds on worlds!
“ Amazing pomp! Redouble this amaze;
“ Ten thousand add; add twice ten thousand more;
“ Then weigh the whole: ONE SOUL *outweighs them* ALL;
“ And calls th' astonishing magnificence
“ Of *unintelligent* creation, *poor*[1]*!*”

But, if we would find the *principle* of that crude and abortive reflection brought to its full birth, and delivered forth in all the perfection of its symmetry, we shall find it ready to our hand; not indeed in the *Chanter of Nature*, but, in the *Psalmist of God;* not in the sphere of *physical* inspiration only, but, where *moral* inspiration exalted the mind to the immediate presence of the *Great First Cause*, as the final scope to which universal existence, both moral and physical, invariably and immediately points. It will then assume this exalted form: “ *When I consider* THY “ *Heavens, the work of* THY *fingers; the Moon and* “ *the Stars which* THOU *hast ordained; what is* “ MAN, *that* THOU *art mindful of him, or the son* “ *of* MAN, *that* THOU *visitest him!* THOU *madest* “ *him but a little lower than the angels,* THOU *hast* “ *crowned him with glory and honour.* THOU *hast*

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[1] YOUNG, *Night Thoughts.*

"*made him to* HAVE DOMINION *over the works of*
"THY *hands;* THOU *hast put all things in subjection*
"*under his feet!*"

Here, we trace the aerial soar of the eagle, instead of the heavy ground-flight of the earth-fowl; we perceive the aspiring sublimity of revelation, instead of the flatulency of a terrene philosophy; we discern the true humiliation of religious gratitude, instead of an affected depreciation of our highly favoured nature; and we become practically sensible of the infinite disparity of the effects wrought in the soul, by contemplating the *chaotic crystallisations* of the *Mineral* geology, or the *Creative Fiat* of the *Mosaical.*

CHAPTER IX.

LET us now return to the record, which is thus concluded by the historian:

> " *Thus, the* HEAVENS *and the* EARTH *were* " *finished, and all the host of them.*
>
> " *Now, on the* SEVENTH DAY GOD *had ended* " HIS *work which* HE *had made; wherefore, on the* " SEVENTH DAY HE *rested after all* HIS *work* " *which* HE *had made.*
>
> " *And* GOD *blessed the* SEVENTH DAY, *and* " SANCTIFIED *it; because that in it* HE *rested* " *after all* HIS *work, which* GOD *had created and* " *made.*"

" Thus, in the distribution of *the days,* (says " Bacon,) we see, that *the day* on which God " rested and contemplated His works, was blessed " above *all the days* during which the fabric of the " universe was created and arranged[1].—He then " gave them *constant and perpetual laws,* which " we call *of nature,* which is nothing but the " *laws of the Creation;*" and accordingly (as we have seen), Josephus observes, " that Moses only " *begins to speak of nature, or natural operations,* " *after the seventh day*[2]." To declare the *immediate*

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[1] *De Aug. Scient.* vol. iv. lib. i. p. 37.

[2] See above, p. 202, 203.

acting of the Author of nature in *perfecting* every member of this terrestrial system in its *first formation,* prior to the existence of any law or any operation of nature, and thereby to dispel the darkness which *ancient heathenism* spread, and which *modern physics* maintain, on the *origin of things,* was the *first object* of the Divine Revelation imparted by Moses; when therefore it is said, "*God ceased to act,*" it is said, by necessary implication, "*nature began to act;*" so that the *seventh day* is not more commemorative of the *former cessation,* than it is of the *latter commencement,* both being momentarily coincidental. However the Mineral Geology may relish this great truth, it is become indispensably necessary for the *soundness of science in its first principles,* that it should be distinctly and unreservedly asserted. It was in His sovereign character of *Author of nature,* that God made that memorable declaration by His prophet:—"Thus saith the Lord, Who giveth "the Sun for a light by day, and the ordinances "of the Moon and of the Stars for a light by "night; Who divided the Sea when the waters "roared: the Lord of Hosts is His name: 'If 'those *ordinances* (or *laws, νομοι*) depart from 'before Me, then the *seed of Israel* also shall 'cease from being a nation before Me for ever. 'If heaven above can be measured, and the foundations of the earth searched out beneath, I will 'also cast off the *seed of Israel*[1].'" I would strongly recommend to the physical philosopher, to the propounder of *chaotic fluids* or *amorphous pastes*, to contemplate on the one hand, those "*ordinances*," and on the other hand "*the seed of* "*Israel*;" and to observe, whether the former "have *departed from before their Creator*," or whether "the latter (whose historian we are here "examining) have *ceased to be a people before Him?*" A very small share of shrewdness and integrity of intellect, will be sufficient to enable him to draw some important inferences from the comparison; bearing very decisively on the present question, of the MODE *of all first formations*.

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[1] Jeremiah, xxxi. 35, 36.

This concluding article of the history, presents much matter for our most serious consideration.

Great and inestimable have been the *ends* attained by that sacred ordinance, which appointed *all time* to proceed by perpetually recurrent measures of *seven days*. For, while God provided in the heavens, on the *fourth* day, a perpetual *natural calendar* of time divided into large measures, which attracted the attention of the mind to *natural* and *material* objects; He provided, by the *sanctification of the seventh day*, an entirely distinct, *moral calendar*, subdividing those large measures into smaller and more convenient measures, and determining the attention of man perpetually and immediately to HIMSELF[1]; and which was founded on a principle, and proceeded by a ratio, that prevented the possibility of its ever becoming confounded with, or lost in, the former. For, although some *physical* philosophers of the last century perversely attempted to ascribe the origin of the *hebdomadal* computation, or computation by 7 *days*, or *weeks*, to the *quarters* of the moon as marked by its different *phases*[1], in order to invalidate the divine origin of that computation; yet, a child in calculation is able to shew, that the ratios of the two computations are so essentially and perpetually at variance with each other, that though they can always be adjusted by *equation*, yet they can *never fall into each other;* but, that their diversity must have been apparent after the first month, and would have continued more and more to manifest

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[1] "It is no rash assertion (observed a late most estimable Prelate), "that from this Holy Institution have accrued to man, more knowledge "of his God, more instruction in righteousness, more guidance of his "affections, and more consolation of his spirit, than from all other

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" means which have been devised in the world to make him wise and " virtuous. We cannot fully estimate *the effects of the Sabbath,* unless " we were once deprived of it. Imagination cannot picture the depravity " which would gradually ensue, if *Time* were thrown into *one promiscuous* " *field,* without those heaven-erected beacons to rest and direct the passing " pilgrim. Man would then plod through a wilderness of being; and " one of the main avenues, which now admits the light that will illumine " his path, would be perpetually closed." *Sermons,* by the late Rt. Rev. THEODORE DEHON, D.D. Bp. of S. Carolina, vol. i. p. 152, 1st ed.

[1] DE LA LANDE, *Astronomie,* Nos. 58 and 277. To give an *air* of learned support to this gratuitous and unfounded allegation, this scientific author refers in his *margin,* to Herodotus, ii. 82, and to Dio Cassius, xxxvii. 18; neither of which writers, however, say one single word bearing to the point for which their names are cited. The latter only says, that the Egyptians named the days after the seven planets; but, neither of them makes any allusion whatever in those passages, or elsewhere, to a *division of time into weeks by the phases of the moon,* which is the only point here in question.

itself as time continued to advance; the *hebdomadal month* consisting exactly of four weeks, or 28 days, but the *lunar month* of 29½.

We thus perceive that the *inchoations* or *beginnings* of all the three computations of time, *solar*, *lunar*, and *sabbatical* (if described according to their *indications*), or, *annual*, *menstrual*, and *hebdomadal* (if described according to their *measures*), were *concurrent:* That the *first day of creation*, was the commencement of the first *year* and first *month*, testified by the *phenomena* of the *fourth day;* and the commencement of the *first week*, testified by the sanctification of the *seventh day*. We thus apprehend the *order*, in which the new creation, and *system of time*, began by the counsel and disposal of God; which *order*, has proceeded uniformly and without interruption from that period, and will continue so to proceed until the *conclusion of time*, which will be no other than the cessation of the stupendous machinery of this planetary system, when "*there shall be time no longer*[1]*!*" If we could look back with accurate discernment through all past time, we should find a precise concurring date of *year*, *month*, *week*, and *day*, affixed to every event which has occurred in time; which consideration will make us sensible, that what we are apt to term the *obscurity of time*, is no other than the *obscurity of our own knowledge* with respect to past events. But, by thus contemplating time *in*

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[1] Rev. x. 6.

itself, and in its general nature, we shall be sensible how admirably its compound relations have been maintained from its commencement. It presents to the thoughts a perfect, minutely noted *calendar*, whose leaves are blank to our intelligence where *history* has not filled them up; so that our confusion of early history does not result from the want of a precise date to affix to events, but from our incapacity to apply the events to the dates which properly and perpetually pertain to each of them.

What renders it material to impress this fact upon the mind, is, that the mode which learning and science have adopted to facilitate the arrangement of *historical events*, is unfortunately founded upon a principle, which, though it may serve a purpose of *history*, produces radical confusion in contemplating *chronology*. For, since chronology is the *science of time*, and since *time* signifies nothing else than the succession of the *diurnal revolutions* of the earth, collected into *annual revolutions*, and these multiplied by 100, and 1000; our general view of time ought to commence with the *first revolution of the earth*. That is its *true origin* or *epocha*, with respect to *fact*. But, instead of that *true epocha*, an imaginary scheme of time, having its commencement 532 years, (or one entire *Victorian* or *Dionysian* cycle,) before time actually did commence, has been substituted; by which means, our retrospective view of that admirable system is, by man's artifice, contrived to terminate in *obscurity and nothing*. A distinct apprehension of that system, demands a distinct apprehension of its *first procession* and *succeeding progress;* but, by fixing that first procession by a rule of *hypothesis* and not of *reality,* we adapt historical facts to an *imaginary* and not to a *true* scale of time. Such is the celebrated JULIAN PERIOD, invented by the learned Julius Scaliger in the sixteenth century; which was presently adopted by all the learned world, and still remains the most general scale to which the events of ancient history are referred. That eminent scholar conceived the idea, of multiplying into each other the *numbers* of the solar cycle, 28, of the lunar cycle, 19, and of the indiction, 15; which yielded him the *number,* 7980. Of this *number,* he made a *scale of years;* fixing the *year of the Creation,* to the *year* 533 *of his scale.* It is manifest, therefore, that the 532 years preceding the year assigned by him to the creation, are mere *arithmetical fictions;* having no more relation to *reality,* than the *chaotic ages* or *epochas of Nature* of the mineral geology. The mind, thus habituated to refer the course of *time* to an origin which has no reference to *historical fact,* but merely to the *first term of an artificial arithmetical calculation;* views it falsely in principle, and without any character of its true nature. Instead of tracing it to its *real commencement,* and perceiving both *time* and *history* to proceed from thence in parallel and equal courses, and with exact and perpetual correspondence between all their parts, it is taught to leave history and creation behind, and to fix its view upon an imaginary point in *unreality and non-existence.* And, from thus considering time without any *real origin,* a notion of *obscurity* is necessarily excited, and combined with the notion of past time; and thus, man's artifice defeats the gracious purpose of God, which was, *to impart to him a distinct and clear idea of the origin and progress of time.*

To recover the benefit thus wantonly lost, was the object of the meritorious labours, during thirty years, of a learned German of the middle of the last century; who was justly sensible, both of the evil of the prevailing system, and of the value of that which was so inconsiderately neglected. In introducing his new scheme, he thus expressed himself: "Many, and almost innumerable, sys-
"tems of chronology are before the world, of
"which, if we may venture to speak the truth,
"not one has hitherto been proposed which is
"free from doubt and uncertainty; the reason of
"which, is the want of a *fundamental chronology,*
"in which the *first year of the world* and all
"the succeeding years might be accurately de-
"scribed, according to the courses of the *sun* and
"*moon.* This object, Scaliger proposed to attain
"by means of the *Julian Period.* But, since that
"Period does not begin with the creation of
"the world, but *very long before it;* since it does
"not consist of complete solar years, but merely

" of Julian years; and since it is *not historical*, " but merely *hypothetical;* it is evident, that it " cannot serve for a *basis of chronology*. The " contemplation of that Period, however, opened " to me an occasion of discerning a *true fundamental chronology*, in the JUBILEAN PERIOD im" parted by God Himself in the sacred Scripture. " However surprising this may appear, it will " nevertheless be clearly demonstrated, in the " following pages—*that this Period begins with* " *the* FIRST YEAR OF THE WORLD[1]; *that it* " *proceeds by the courses of the* SUN *and* MOON; " *and, that, by means of* EPACTS *which it most* " *accurately describes, it indicates the new and full* " *moons through all the ages of the world; and* " *therefore that it constitutes a* FOUNDATION *for* " *Universal Chronology*[2]."

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[1] " *As* there is no Mosaical Astronomy, *so* there is no Mosaical " Geology:" observes, laconically, my reviewer of the *British Critic*. But, as we have seen that Moses has imparted to us *geological facts* to *ground* a geology, so do we see that he has imparted to us *astronomical facts* to *ground* an astronomy; and those facts are here carefully and skilfully employed for that purpose, by this upright Chronologist. A far abler reasoner falls into the same error: " Since the Sacred Books have " not communicated the *principles* of Astronomy or Chemistry, there was " no reason to expect from them *those* of other departments of knowledge." (*Ed. Rev.* No. lxxvii. p. 196.) See, in the *Introduction*, the due distinction made, between *a physical system* or *scientific physical principles*, and *grounding physical facts* from which we are to *deduce those principles*.

[2] " PRÆLUSIO CHRONOLOGIÆ FUNDAMENTALIS, &c., *in* CYCLO " IOBELEO BIBLICO *detectæ, et ad Chronologiam tam Sacram quam* " *Profanam applicatæ*," *à* IOHANNE GEORGIO FRANK, &c. *Goettingæ*, 1774. See Note [II.] *On the Jubilean Period of* FRANK.

Without pursuing, here, the details of this writer's curious and important undertaking; it is quite evident, that, whether our intellectual efforts may or may not be able to discover the relations of *past events* to those distinct *characters* of time, yet, *time itself* has ever proceeded with those distinct characters; and in the constant order here described by the learned and laborious German.

CHAPTER X.

LET us now review this "*revealed history of the* "*Creation,*" or of the *mode of first formation*, to which Bacon introduced us; with reference to the standard of Newton's conclusions on the one hand, and to the conclusions of the *mineral* geology on the other.

This history records; 1. That, all the *first formations* of *mineral*, of *vegetable*, and of *animal matter*, were severally effected, in order of succession, by a *mode* uninvestigable by any scheme or science of man, namely, *the mode of* CREATION *by* GOD. 2. That, each of those operations was *immediate;* the formations resulting at once, without any instrumental mediation, in full perfection for the *ends* which they were to serve, from the immediate exercise of the divine *wisdom, will,* and *power*. 3. That, although the Divine Intelligence thought fit to create and to set in order His first formations *in successive moments of time*, yet He produced them *without any agency of time*. 4. That, on the *first* day, by His Almighty "*Fiat,*" He caused all the *first formations* of the *mineral matter* of this globe, in one immediate simultaneous operation, imparting to it at the same moment its *first diurnal revolution;* in which operation, the *solid body of the earth* was perfectly constituted in all its parts, distinct from the *body of waters* which He caused to be diffused over its whole superficies. 5. That, on the *third* day, by a similar immediate and simultaneous operation, He caused all the *first formations* of *vegetable matter*, in their full maturity; and, 6. That on the *fifth* and *sixth* days, He in a similar manner, and in similar maturity, caused all the *first formations* of *animal matter*.

We thus find, in the *Mosaical geology*, the *three kingdoms* of matter equally connected with their *common Intelligent Cause;* by whom they were both " created, and set in order, in such " sizes and figures, in such proportions to space, " and with such other properties, as most con" duced to the end for which He formed them; " and, therefore, *that none of them rose out of* " *a* CHAOS, *by mere laws of nature*."

But, this is the very induction of Newton himself, derived from *universal analysis*. Which induction, therefore, being in perfect concord with the *Mosaical geology*, but in total discord with the *mineral geology*, determines the question with which we set out, namely—*the* MODE *of first formations*. For, *both geologies* appealed to Newton; and, upon that appeal, Newton decides without hesitation in favour of the *Mosaical*, and formally affixes to the conclusions of the *mineral*, the stigma of " UNPHILOSOPHICAL."

Bacon's philosophy, no less peremptorily denies all *chaotic formation*, together with all the undeterminable *periods of time* which it is obliged to postulate. He acknowledges no other agency, either in the act of *power* which "*created*," or in the act of *wisdom* which "*disposed and adjusted*" this globe, than the hand of God Himself: the former, in "*one moment of time*," the latter, in "*six* natural and consecutive *days*;" and he could discern no sound, philosophical objection, to the admission of those facts. He calls the first formation "*confusa*," in deference to the text of the received versions, and attempts no critical explanation of the word; but, we have seen, that it is to be understood with relation only to *vision* or *perception*, and not to the *subject itself*[1]. He allows of no "*fermenting, digesting, and preparing*;" of no "*chemical dissolution, precipitation, or crystallisation*;" of no "*creative seeds* or *elements*, in *liquids* or in *pastes*;" of no other *actor* in arrangement, than *God Himself*, and of no other *mode* of His action, than *immediate*; and he pronounces all those *laws*, which *physical* philosophy denominates "*laws of nature*," and to which the mineral geology would ascribe all first mineral formations, to be no other than the "*laws of the Creation*;" which did not and which could not *begin to operate*, until God had called this mineral globe into being, and had *finished* the perfect arrangement of every thing constituting and pertaining to its system. And he thus professes his belief:

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[1] See above, p. 154 and 175.

"I believe, that God created heaven and "earth; and gave unto them constant and perpetual laws, which *we call of Nature*, which is "nothing but *the laws of the Creation:* — that the "*laws of nature* which *now* remain, and govern "inviolably till the end of the world, *began to be* "*in force when God rested from His work:* — that, "notwithstanding God hath rested from *creating* "since the *first sabbath*, yet, nevertheless, He "doth accomplish and fulfil His divine will in *all* "*things, great and small, general and particular*, as "full and exactly by *providence*, as He could "do by *miracle* and *new creation;* though His "working be not immediate and direct, but by "compass; not violating *nature*, which is *His* "*own laws*, upon His creatures[1]."

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[1] *Confession of Faith.*

END OF PART II.

NOTES.

NOTE [I.]

On the Mosaic Days of Creation.

THE learned and pious author of the *Treatise on the Three Dispensations*, in the *geological disquisition* which he has introduced, as it were *episodically*, into that work, has made a very strenuous effort, (which I have observed with extreme regret, and with equal astonishment;) to secure to the word *day*, in the first chapter of Genesis, that distracting and improbable *vagueness of signification*, which shall render it available to denote measures of time from *twenty-four hours* to *six thousand years*, and even to periods wholly undetermined; adding, I must risk to say, *intensity* to the *error* which has already too much prevailed upon this philological and critical question. "In Scripture," says he, "nothing can well be more *in-*"*definite* than the term which we translate by the English "word *day*:—in truth, the term, *abstractedly*, would be "*more accurately* expressed by the English word *period* "than by the English word *day*[1]."

These allegations, he thinks, "may be proved, partly "by the *analogy of language*, partly by *the very necessity* "*of the narrative*, partly by *ancient tradition*, and partly

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[1] Vol. i. p. 111, 112. The sublime researches and speculations, and the ingenious expositions of this learned work, do not in any manner depend upon the *confirmation of the geological theory* which forms the third chapter of the first volume; and which is entirely distinct from, and extraneous to, its *general argument*.

" (and that most decisively) by *the discoveries, or possibly* " *the re-discoveries, of modern physiologists.*" With respect to the *last* of these supposed *proofs*, the *Comparative Estimate* was principally directed to an exposure of its fallacy; and, after examining, with the attention due to such a writer, the arguments which he has adduced in support of it, I must confess that I find nothing to make me apprehend, that the *Comparative Estimate* has not fully effected its original purpose. With respect to *ancient tradition*, derived from the *Hindoos, Persians*, and *Etruscans*, I must also frankly confess, that I regard it as totally *null*, and absolutely *inadmissible* in this particular question. With regard to the alleged *necessity of the narrative*, I shall have occasion incidentally to evince an opinion; but, I shall direct this note, principally, to an examination of the *first* point, viz. the *analogy of language*. And I shall here be under the necessity of endeavouring to render it conspicuous to every plain understanding,—that the preceding positions of this pious and zealous expositor are the results of an hasty and incautious criticism, and that the conclusions which he draws from them are *altogether fallacious and radically unsound*,—by shewing, that the Hebrew noun, יום IOM—*day*, is *always definite in its import*, if it be minutely examined and accurately apprehended; and that it *essentially excludes* the wide and extensive notion which we attach to the " English word *period*." With a view to this very material purpose, I shall here consider the several significations which this highly respected writer has been led to ascribe to the word "*day*" in Scripture, in the order in which he himself has presented them.

1. " Sometimes," says he, " it *denotes—a single revo-* " *lution of the earth round its axis.*" This it may be said to do, in point of *philosophical truth*, and such undoubtedly will be its signification *when interpreted by the science*

of these latter ages; but it is, nevertheless, a great inaccuracy and oversight to affirm, *philologically*, that it therefore *denotes* that revolution in the original language, for, most assuredly, it does not. According to the genius of that language, the word only denotes, *the portion of* ACTUAL TIME *which is included between two evenings,* or *two sun-sets.* This is the whole extent and only true notion of the term, *iom—day,* according to its primitive and genuine acceptation in the language of the original Scripture. Simon, with much reason, considers its strictest sense to be confined to the *time of light*—"God called the *light, day*"—although it was habitually extended to its *two nocturnal limits;* and he deduces יום IOM—"*day,*" from the root ימה *iama*—"*it is hot*"—preserved in the Arabic[1]; referring for his evidence, to Gen. xxxi. 40, and Jerem. xxxvi. 30. This interpretation is the more probable, because, as Michaelis has well observed; "*all the first significations of primitive words relate* "*to the senses—omnes primitivorum primæ significationes* "*in sensus incurrunt*[2]." It is of the most essential importance, to *adhere closely* to this discrimination, which is the *key* to all truth in the criticism on which we are entering; and to put the *modern philosophical interpretation* entirely out of sight, in pursuing *philologically* the true signification of the Hebrew *iom—day,* and in determining its proper meaning on *every given occasion.*

2. "Sometimes," says he, "it *denotes—a revolution* "*of the earth round the sun,* or what we call *a natural* "*year.*" This statement is radically and palpably incor-

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[1] "Sic dictus (ab ימה *caluit, ferbuit,*) quia in regionibus, à primis "hominibus habitatis, *calidissimus* est, ut contrà nox frigidior: Conf. "Gen. xxxi. 40. Jerem. xxxvi. 30. Adde, quòd Deus nomen istud "*luci,* naturâ suâ *calidæ,* primitus imposuit, Gen. i, 5." *Lex. Hebr. et Chald.*

[2] *Suppl. ad Lex. Heb.* p. 214.

rect; as will be immediately perceived on consulting the authorities to which he appeals. Num. xiv. 34. " After " the number of *days* in which ye searched the land, even " *forty days*, each *day*, IOM, for a *year*, SHANAH, shall ye " bear your iniquities, even *forty years*." And reversely; Ezekiel, iv. 6. " Thou shalt bear the iniquity of the " house of Judah forty *days*, I have appointed thee each " *day*, IOM, for a *year*, SHANAH." I would venture to ask the respected author, in which of these two passages does the word *day* " denote a revolution of the " earth round the sun, or a natural *year*?" It is not possible to keep the proper and distinctive significations of those terms more entirely separate, than they are kept by their *contra-positions* in these two cited passages. In both, the word *day* has relation only to " a single " revolution of the earth round its axis," although it does not *denote* it; and that diurnal revolution God was pleased to ordain, expressly and specially, in those two particular cases, first for the *exemplar*, and, secondly, for the *representative*, of an annual revolution; but the term *day*, IOM, has no other than its simple signification in either passage.

The remaining passage of the Hebrew Scriptures to which the learned author appeals, and to which the two passages which he cites from the Greek Scriptures are subordinate, is to be brought to another and a very different criterion of criticism. Dan. xii. 11, 12: " And from " the time that the daily sacrifice shall be taken away, " &c., there shall be IAMIM a thousand two hundred and " ninety. Blessed is he that waiteth and cometh to the " IAMIM a thousand, three hundred, and thirty-five." We know, that the *plural*, ימים—*iamim*—*days*, sometimes obtains the *singular* signification of *a year*, because *a year* consists of a *plurality of days*; in which sense it denotes, conventionally, an exact *annual complement of* *days*[1]; and the plural, *iamim*—*days*, and the singular, *shanah*—*year*, are therefore made convertible in the same paragraphs; as in Levit. xxv. 29, and 1 Sam. i. 3 and 7; on which account David Levi points out, in his *Lingua Sacra*, that the plural *iamim* denotes " *a full year*;" and he instances Gen. xxiv. 55, and Levit. xxv. 29. So also Castell, and Simon, in Gen. iv. 3, and the preceding passages. We have a remarkable instance of this sense of *iamim*, in Num. ix. 22, " or two days (*iamaim*) or a " month, or a *full year* (*iamim*)." Again, in Exod. xiii. 10, " *m-iamim iamim-ah*—from *year* to *year*." When, therefore, we read in Dan. xii. 11, 12, " there shall be " *iamim* 1290—that cometh to the *iamim* 1335," we are not immediately to infer, that each of those *iamim* is to be interpreted *iom*—*day*, in the singular; but we are to understand, that they are annumerations of those conventional IAMIM, or *annual sums of days*, each of which is understood to denote *a year*. And this is shewn, by the common idiomatic rule, or practice of the language—viz.: " that *days*, till *ten* inclusively, are always expressed in " the *plural*; but, *from ten upwards, in the singular*[2]." But, here we have the plural form *iamim*, with the high numerals, 1290, and 1335. Hence, then, we are to conclude, that *iamim*, in these two cases, is equivalent, collectively, to the singular *shanah*—*year*, and that it does not denote *individual days*, but *complements of days*, as a noun of multitude, according to ancient idiom; and, without any relation to the *peculiar representative ordinances* recorded in the passages above cited from Numbers and Ezekiel. And so also, in Rev. xi. 3; xii. 6, the phrase "*days* (ἡμεραι) 1260," is the *same Hebraism*, preserved by the sacred Hellenistic writer; and is to be interpreted in the same manner as the ימים—*iamim* in Daniel. "The "Apocalypse abounds with Hebraisms, observes Mi- "chaelis, which must be visible to every one, who has "only a moderate knowledge of Hebrew.—Some com- "mentators have supposed, that the Apocalypse was "originally written in Hebrew, and that our Greek text "is only a translation[1]."

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[1] " ימים, *dies*, ellipticè pro *anno* poni, in lexicis jam monitum, addito " manifesto exemplo et probante, Lev. xxv. 29. Adscribo exempla plenioris dictionis, שנת ימים, *annus* (proprio sensu, quo idem sonat quod " *annulus*) *dierum*, Genes. xli. 1; Jerem. xxviii. 3, 11: paulum mutata " constructione, שנתים ימים, *duo anni*, nempe *dierum*: et תקופת ימים, *circuitus, circulus dierum*, 1 Sam. i. 20, ellipticeque, Gen. xxiv. 55. Num. " ix. 22. Jud. xiv. 8. Nehem. xiii. 6."—MICHAELIS, *Suppl. ad Lex. Heb.* No. 971.

[2] D. LEVI, *Hebr. Grammar*, p. 123.

But, the peculiar signification of the *plural* IAMIM, is a point totally irrelative to the present question, which turns exclusively upon that of the *singular* IOM: that *singular noun*, which is the word used by Moses in his *history of each* DAY *of creation*, and which alone we have here to consider, *never, in any single instance, denotes a year*, but only each of the *individual parts* of a year which lie between two sun-sets. It is true, that it is sometimes represented as denoting *time*, but, in that case, it *always denotes, and defines, actual time*, or, *time actually impending*[2]:—"at the time *when*—at the time *now*," as Parkhurst puts it, which draws the sense within the *time of a day:* but it *never* denotes time *in flux,* abstracted or general, prospective or retrospective; and we might with just as much foundation affirm, that the Greek singular, *ἡμερα,* the Latin *dies,* the French *jour,* or the English *day,* are terms peculiarly indefinite, and would be more accurately expressed by *περιοδος, periodus, période,* and *period,* as affirm it of the Hebrew singular, *iom.* The plural *iamim,* sometimes also denotes other *definite periods,* as a month, but never an *indefinite period:* but *iom,* in the singular, *never denotes any period at all.* If, therefore, the noun in Gen. i. had been intended to denote any *long period,* or any measure of time other than a SINGLE DAY, it would have been IAMIM, in the plural, as a collective term, and not IOM, in the singular, *which it is.*

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[1] *Introd. to the N. T.* vol. iv. p. 532 and 537.

[2] Cruden, in his Concordance, falls into the common error. "*This* "*day*, or *to-day*, היום, does not only signify the particular day on which one "is speaking, but likewise *any indefinite time*;" and he thinks he proves his position by quoting—'Thou art to pass over Jordan *this day*;' and he adds, "that is, in a *short time after this*." But, besides that this interpretation has no relation to *indefinite time past*, the word is here used *definitely*, to express the *termination* of the indefinite wanderings of the Israelites, and is equivalent to the Latin JAM—*jam transiturus es;* which Latin word is very probably derived from the Hebrew *iom*: "JAM, Adv. "*temporis præsentis*—properantis est, et se aliquid *protinus facturum* "indicantis." GESNER. *Thes. Rom.*

3. " Sometimes," says he, " it *denotes—a whole mil-* " *lenary.*" This allegation, is altogether as precipitate as the preceding, as a reference to the cited authorities will equally demonstrate: *viz.* Psalm xc. 4, and 2 Peter, iii. 8. " A thousand *years* in Thy sight, are but *as* yester-*day.*" The Psalmist, magnifying his Infinite Creator, affirms simply; that the lapse of a *thousand years* to His eternity, is as the lapse of *one day* to our mortality. And St. Peter thus comments on that passage: " *One day* is with the " Lord as a *thousand years,* and a *thousand years* as *one* " *day;*" enlarging the Psalmist's reflection, on the irrelation of all temporal measures to God. Here, then, the proper significations are kept just as *distinct* as in the former article; and the word *day* does not " denote a whole mil- " lenary," but is entirely restricted to its simple signification.

4. " Sometimes it *denotes*—a *period* of probably *great;* " but of *wholly undetermined length.*" This is the most material allegation for us to attend to. The evidences cited by the reverend author for this sense of the word, are, Isaiah, ii. 12; xiii. 6. Joel, i. 15. Zephaniah, i. 7,

8, 18. Malachi, iv. 5. 1 Thess. v. 2. 2 Peter, iii. 10. All these passages exhibit the phrase so frequently occurring in Scripture—"*the* DAY *of the Lord.*" But, the simple idea on which this phrase is founded, may be correctly collected from the prophet Zechariah, xiv. 7. "And "it shall come to pass in *that day,* that the light shall "not be clear nor dark, but it shall be *one day* known to "the Lord, not day nor night, for *at evening time it shall* "*be light.*" This is the prophet's description of "*the* DAY "*of the Lord,*" with which the chapter had opened. Now, whatever *prospective ideas* may arise to the imagination from this *description,* yet, the *idea* truly pertaining to the term *day,* in the description, is no other than that of an *ordinary actual day;* for it has an "*evening time*" set off from its commencement, and that *commencement* is thus again expressed by the prophet Ezekiel, vii. 10. "Behold the *day,* behold it is come, the "*morning is gone forth.*" Thus, in the great *prophetic day,* the primitive signification of the term still holds its simple ground: it *denotes,* definitively and exclusively, the *actuality* or *presence* of a time; but it does not *denote,* indefinitely or inclusively, *continuation* or *length* of that time. It is employed, only to produce an impression of *present occurrence* or of *actual arrival;* without involving in its signification any thing ulterior, or more extensive. It is the primitive signification, detached from the consideration of its nocturnal limits, drawn to the point of *actuality,* and having no respect to any following "period "of length, great or undetermined." In all the passages above referred to, the sacred prophets use the word *day* in the same ordinary sense as our poet, when he says:

> "The *day* is broke, which *never more shall close*[1]."

We know, that there must be a *last day,* which will *begin* upon the world like all former days, but which will not *end* as all former days have *ended;* and, from its beginning, or "*morning*," a distance of "*evening*" may be set off; but, that distance will no more be attended with its accustomed concomitant of *darkness*. The term *day*, in the phrase "*day of the Lord*," when it relates to the *final consummation*, is employed by the prophet, as by the poet, to denote that *last incipient but interrupted day*, in its most popular sense; and the *term* is in no manner significative or comprehensive, but essentially exclusive, of the *duration* which shall follow, although the mind instantly *apprehends that duration* from the description. The whole design of its use, is to rouse and stimulate *moral sensibility*, by *anticipating the actuality of the particular day*, and by fixing the mind on its *presence*, and on the *suddenly intervening presence of God;* but, not to enlarge the bounds of *prospective, chronological speculation*, which vanishes in the contemplation of that *actual presence*. It is, as where our Lord says: "As in the days of Noah they married and were "given in marriage, until *the day* when Noah entered into "the ark, and the flood came, &c.; even so shall it be in "*the day* when the Son of man shall be revealed: for He "shall come in *a day* when ye look not for Him, and in "*an hour* that ye are not aware." Who, in reading these words, understands the words, "*day*" and "*hour*" —to *denote* and *include* the *eternity*, which he is sensible will follow? Here then, we have pretty good authority, both for the *Hebrew phraseology*, and for the *language of prophecy*. And it is the same, whenever the word relates to any *change* which the Divine interposition may introduce into human affairs. That change must *begin* to come upon the world in *some one day*, and it is the *actuality of its arrival alone*, as a *punctum temporis* to awaken religious apprehension, that is denoted by the word *day;* which thus invariably preserves its relation to its primitive signification. The enlargement of this signification into that of "*a period of great or undetermined length,*" is an unconscious act of the *imagination's* vivacity, accumulating compound ideas upon a simple term. Whenever *sequence of time* is intended, the word is followed by terms designed to denote that sequence; as, יום ויום—*day after day,* &c. The singular noun *iom—day,* cannot signify a *period,* in any other sense than that of a *punctum temporis;* which is a sense, that will in no way suit the interpretations and speculations of our respected author. In this sense, it may be the *commencing point* or *epocha* of a great and undetermined period, but it will ever remain totally distinct, and in arrear, from the *flux* or *progress of that period.*

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[1] YOUNG, *Night Thoughts,* ix. 204.

From this last consideration, combined with what has been exposed in the second article, relative to the plural, "*iamim—sums of days,*" in Daniel, we discern the fundamental inaccuracy of the *mystical* interpretation of this word; of which our learned author, following that sublime expounder of prophetical chronology, Joseph Mede, (whose general chronological exposition is not affected by restoring the mystical interpretation to philological and critical truth,) thus speaks: "The great *day* of judgment "*denotes* in scriptural *language,* as it has been *well proved* "by an eminent expositor, not merely a single *point of* "*time,* but a *period of very considerable length;* a *period,* "in short, extending from the close of the 1260 *days* so "much celebrated in the prophecies of Daniel and St. "John, through the whole *millennium,* to the dissolution of "all things, when the Messiah shall appear to judge both "the quick and the dead[1]." But, the "*day*" of judgment, as we have seen, *denotes in language,* only the *point of time,* or proper *day,* when that awful and stupendous intervention of Divinity, (which our author here describes according to his own anticipation of events,) shall *break in upon the world:* and the *time of those events* in their *succession and duration,* is in no manner *signified* or *denoted* by the word *day,* which retains its native and proper signification. On the other hand, the "*Great Calendar of Prophecy*" presented by the eminently learned Mede, becomes more luminous to the intelligence, on perceiving; that the "*iamim*"—*days* of Daniel, do not denote *days* individually and mystically, but collectively, and in *periodical connumerations,* according to an ancient familiar phraseology.

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[1] Vol. i. p. 424.

5. "*Sometimes,*" says our ardent author, "*it denotes* "*—all the six demiurgic days collectively; that is to say,* "ALL THE SIX *demiurgic days viewed as jointly forming* "A SINGLE *demiurgic day.*" This is, perhaps, the boldest and most singular position that was ever advanced in Biblical criticism; and this signification is found by its author, not "*sometimes,*" but *only once,* and is deduced by him from *only one single verse,* viz. Gen. ii. 4. Other learned commentators have, indeed, understood the word *day* in this place to denote *time;* but, this minute and deliberate analysis, and subsequent synthesis, of its ascribed signification, is perfectly novel, so far as my researches have carried me. I shall consider this verse, both with relation to its *context,* and to the *original text;* respects, without which, the learned author knows, at the least as well as I do, how insecure all criticisms on Scriptural language must be. The learned author also knows, that the Hebrew language having but *one past tense,* and therefore being unable to express grammatically the differences of *imperfect, perfect,* and *pluperfect past time,* it is by the general sense alone that those *times* can be duly collected and distributed.

The sacred historian, having, in his *first chapter,* concluded his relation of the *six natural days* of *immediate Divine operation*, commences the next division of his history, with a consideration of the following, or the *seventh natural day*. In his contemplation of that *seventh day*, in which *creation* was, for the first time, *over* and *past*, he thus takes a *review* of the great incidents which he has recorded.

> " Thus, the heavens and the earth were completed,
> " and all the host, or orders, of them.
>
> " *Now*[1], on the *seventh day*[2], God had finished His
> " work which He had made; *wherefore*, on the *seventh*
> " *day*, He rested, after[3] all His work which He had made.
> " And God blessed the *seventh day*, and sanctified it, be-

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[1] See above, page 167, note on the Hebrew particle ו; also NOLD. *Concord. Part. Heb.* p. 282—318.

[2] It is observed, that the texts of the Septuagint, the Samaritan, the Syriac, and that of Josephus, read in this place " *the sixth day*:" but, on the other hand, the Masoretic, the three Chaldaic, both the Arabic, and the Vulgate, read " *the seventh day*," as in the Hebrew; and the Vulgate further testifies the reading which approved itself as genuine to Jerome, and his learned Rabbin, in the fifth century. The younger Rosenmuller observes, of the former reading,—" quæ lectio vulgari præferenda *videtur*, " quia *sexto*, non *septimo* die, Deus perfecit opus creationis, et *septimo* " die cessavit." But, this very ready and obvious judgment will not maintain its ground on a closer examination; for, as Wolfe has critically observed in his *Prolegomena on Homer*; " sæpe severiori judicio planè " efficitur, ea omnes numeros veritatis habere, in quibus maximæ offensæ " sint, alia autem incertæ aut nullius fidei esse, quæ *perquam probabili et* " *festivo sensu nitent*." p. 25. The *collective completion* of the hosts, or respective members, of the *heavens and earth*, has not proper relation to the *sixth* day of operation, but to the first succeeding day, on which operation had ceased, and *all* could be *equally* contemplated together as *completed*. And it is much more probable that the reading should have been altered from *seven* to *six*, to give it what was precipitately thought " *probabilem et festivum sensum*," than that it should have been changed to *seven*, if it had originally been *six*.

[3] " מִכָּל־ *post* omne, Gen. ii. 2." NOLDIUS, p. 465.

" cause that in it He rested, after all His work which He
" had created and made. Such were the generations, (or
" productions,) of the heavens and the earth in their crea-
" tion, in *the day* in which the Lord God had made the
" earth and the heavens; and every plant of the field,
" which *before*, or *as yet*, was not in the earth, and every
" herb of the field, which *before*, or *as yet*, had not ger-
" minated; for (*when He made these*) the Lord God had
" not caused it to *rain upon the earth*, nor was there a *man*
" *to till the ground*: (*so that they could not have arisen by*
" *any course of nature.*)"

This is the simple interpretation of these latter words, as given by expositors the most learned in Hebrew; and who had no *double object* in their minds, to distract their views in their exposition of the passage: as I shall presently shew. From the intimate connexion and dependence of these sentences, it will appear; that the sacred historian reviews and recapitulates, generally, the works of the *preceding six days*, in his consideration of this *seventh day;* and therefore, that *the day* which our reverend and learned author would convert into " *all the* SIX " *demiurgic days of creative action viewed as collectively* " *and jointly forming* ONE *demiurgic day;*" is, in fact, no other than the succeeding *seventh day of cessation from creative action*, which follows in its due place in the history; for, " *the day* in which the Lord God *had made the* " *earth and the heavens,*" can be no other in this paragraph, than the " *seventh day* (mentioned just before,) in " which God *had finished His work which He had made.*" Such, when brought to the standard of a plain and direct criticism, is the simple import of this much tortured passage; conformably to the wise and important observation of Josephus: " that Moses affirms, that the world and " every thing in it was produced altogether in *six days;* " that God rested on the *seventh day:*—and that Moses

"*. begins to speak of nature, or natural operations, only* "*after that seventh day.*"—*τον κοσμον εν ἑξ ταις πασαις ἡμεραις Μωϋσης και παντα εν αυτῳ φησι γενεσθαι· τῃ δε ἑϐδομῃ αναπαυσασθαι (τον Θεον)·—και δη και* ΦΥΣΙΟΛΟΓΕΙΝ *Μωϋσης μετα την ἑϐδομην* ΗΡΞΑΤΟ[1].

Since, then, the Hebrew IOM in the singular, *never* denotes either a *year*, or a *millenary*, or an *undetermined period*, or a *compound demiurgic day*, but *always* denotes the *actual time of a day*, past, present, or future;—since IOM in the singular, is the term applied by Moses to each of the *six days of creation;*—since the *operations* executed in *each* of those days were CREATIVE ACTS, *to which acts* TIME *could contribute no co-operation;*—and since the series of those *six days* with the following *seventh day*, was specially presented as the *exemplar* of *seven days* to be perpetually observed from thenceforth in *sequence* and *succession*, in imitation and commemoration of them;—there is no ground whatever, either in *true criticism* or in *true philosophy*, that will at all authorise or justify an interpretation of the *days of creation* different from that which they invariably received from the age of the historian, for 3000 years, (until the fantastical and contriving criticisms of a very recent date arose to pervert it amongst *us Christians*, under a spurious character of *philosophy* :)—namely, *a measure of* ACTUAL TIME *lying between two sun-sets*[2]. It was therefore with sound and reflective judgment, and not as a "*cursory reader*[1]," that the younger Rosenmuller, in his *Scholia*, adhered to the interpretation and to the words of his learned father, cited in the *Comparative Estimate*, p. 163: "*We are to understand natural days; each of* "*which, commencing from one evening, was terminated by* "*the next*[2]." The argument of the reverend and learned writer,—that, "if God laboured *six natural days*, and "rested on the *seventh natural day*, the very turn of the "statement will unavoidably *imply*, that He *resumed His* "*labours on the eighth natural day*[3]," and therefore, that the *seventh day* could not be a *natural day*,—will hardly, I should think, be insisted upon by him; because, there is surely no such implication in the statement; and because, we can have no foundation for reasoning of the Creator as of a common week-working mechanic, nor for supposing Him to have *continued the same work* on the *eighth* natural day, which was declared to be *completed* on the *sixth*. His resting on the *seventh day*, as is shewn by the *numerical character of that day*, is entirely *retrospective* to the preceding *six days* of operation; and it does not necessarily induce any other consequence for the *eighth day*, which is not annumerated, than that, *creative operation* being terminated, *natural operation* was then to commence its course; and, that *resting* is presented to us, only as closing

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[1] See above, p. 202, 3.

[2] Among other writers to whom this argument is respectfully addressed, is the reverend author of the *Introduction to the Geology of England and Wales;* and who thus cautiously proposes a similar latitude of interpretation. "We may *perhaps* without real violence to the inspired "writer, regard the periods of the creation recorded by Moses and expressed "under the term of *days*, not to have designated ordinary days of twenty- "four hours, but *periods of definite but considerable length;* such a mode "of extending the signification of this term *being not unexampled in other*

"*parts of the sacred writings*—and we have the *authority* of several "divines in favour of such an interpretation." (p. 9.) This able writer must now clearly perceive the fallacy of such *authority*, and the absence of all *examples* to give it support; and he must be sensible, that such an interpretation is a pure offspring of the "*play of the mind in invention*," when too fastidious to content itself with "*that which is already plainly recorded*." (See the *Introduction* to this work.) If the mind of man is sometimes to submit to the plain word of God, that necessity demonstrates itself to exist here.

[1] FABER'S *Disp.* vol. i. p. 113.

[2] *In Genesin*, i. 5.

[3] FABER, p. 114.

the *model* of the *hebdomadal terms* which God ordained to *succeed* thenceforward, for His own religious service, in perpetual renewal and recurrence.

The reverend author's argument respecting *the* DAYS *of creation*, is summarily this. "If one of the seven days "be a natural day, then all the seven days are natural "days; if one be a period of great length, then all "must be periods of great length[1]. Let us then "take the *seventh* day, or divine *Sabbath*, for our *test*; "for, just as we *understand* the *seventh* day, or *Sabbath*, "so we must *understand them all*[2]. But, *the seventh day*, "*or Sabbath*, (he affirms) *has not yet terminated*[3]: the "divine Sabbath, or *seventh day*, is *therefore a period of* "*not less than* 6000 *years*: hence, *each of the six days* "MUST *have been equivalent to a period equalling or ex*"*ceeding* 6000 *years*[4]." Therefore, *not less* than *seven times six thousand years* have elapsed since the creation; and we are *now* in the year of the world *circ.* 42,000, *at the least.*

This sudden call upon us to admit, for the first time, that our Lord was born *circ.* A.M. 40,170, instead of *circ.* A.M. 4004, according to the vulgar computation, proposes an alarming alteration of our chronology; to which, however the learned author may have familiarised his own mind, we cannot implicitly assent without demanding his *authority*. But, as soon as we are told, that we are to concede this alteration to the "*decisive discoveries of mo*"*dern physiologists*," our alarm at once subsides; and we feel no hesitation in altogether refusing our submission to an authority so incompetent, and so illegitimate for imposing, or causing to be imposed, a *new interpretation* on the *plain terms of revelation*. But moreover, as the measure of time which our author takes for his *rule of computation*, has *not yet terminated*, and as he does not pretend to predetermine its termination, it would be impossible to arrive at any approximation to the real measure of his preceding *six days* which have terminated; so that his chronology, in effect, entirely despoils Scriptural history of the *epocha of the Creation of the World*, as an available *chronological term*.

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[1] FABER'S *Dispensations*, vol. i. p. 112.

[2] Ibid. p. 113.

[3] P. 115.

[4] P. 117.

Proceeding, however, with his new interpretation of the word *day*, the learned author thus represents the *works* of the *six days*. "The *first day*, or *first* 6000 *years*, "was engaged in the *separation of light from darkness*, "and the element of fire from the crude aqueous matter "which constituted the *primeval* CHAOS[1]." How total an eclipse have we here, of that long noted sublimity, "*God* SAID, *Let there be light, and there* WAS *light!*— "*He* SPAKE, *and it was* DONE!"—"The *second day*, or "*second* 6000 *years*, was employed in disengaging the "element of *air* from the same discordant mass, when a "separation of the waters immediately and *necessarily* "took place[2]. The *third day*, or *third* 6000 *years*, was "employed in the separation of the lower waters from "the element of earth, and in the production of *vegetables*[3]. The *fourth day*, or *fourth* 6000 *years*, was "engaged in *forming* and *placing* in the material heavens; "the *sun*, and *moon*, and *stars*[4]. The *fifth day*, or *fifth* "6000 *years*, was engaged in a two-fold work; in the "earlier part, the waters brought forth *fishes*; during the "latter part, they produced *birds*:—*Several great mundane revolutions*[5] MUST *have taken place ere the commencement of the sixth day, and* THEREFORE, *in the*

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[1] FABER's *Dispensations*, vol. i. p. 126—128. See above, p. 194—205, respecting *the Chaos*.

[2] P. 129.

[3] Ibid. p. 130.

[4] P. 132.

[5] P. 134.

" *course of the* THIRD, *and* FOURTH, *and* FIFTH *days.* " The *sixth day*, or *sixth* 6000 *years*, was employed in the " formation, first of *beasts* and *reptiles*, and lastly of *man*[1]. " The *seventh day*, or *actual series of* 6000 *years*, more or " less, gives the *analogical* rule or measure of each of the " preceding[2]." But, the securer " *analogy of language*" has fully established, that, if each of those terms had been intended to denote such *compound periods* as are here assumed, they would not have been described by the singular, *iom—day*, but rather by the plural, *iamim.*

In perusing these brief annals proposed for each of those vast periods, it is impossible not to be forcibly struck by the *contrast* between the multiplicity, moral importance, and rapid succession of the events which have unquestionably filled up these last 6000 years of *experience*, and the penury and uniformity of events which the reverend expositor ascribes *hypothetically* to each of the preceding 6000 years of his own *induction;* a *contrast*, which appears so marvellously inconsistent with what we have been permitted to learn, by analogy, of the Divine economy in the last 6000 years, that it seems quite sufficient, of itself, to determine and demonstrate the *unreality of the former.*

And yet, the venerable author adventures to affirm, that the " *necessity of the narrative*[3] " demands this new and extraordinary interpretation; and he propounds " the " *utility of extending the six days into six long periods*[4]:" an *extension*, of which I apprehend we can have no sort of power, except such as *poetry* exercises over *fact*. But, I must take leave, on behalf of the narrative, to affirm contrarily; that it is the *necessity of his geological hypothesis alone*, that demands it. *Where*, does he find this " *ne-*

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[1] FABER'S *Dispensations*, vol. i. p. 141.

[2] P. 116.

[3] P. 117 and 55.

[4] Contents to vol. i. p. xv.

"*cessity of the narrative*" which he alleges? He finds it, solely, in *one single verse*, not of the *original text*, but, of the *English translation*: viz. Gen. ii. 5. "God made "every plant of the field *before it was in the earth*, and "every herb of the field *before it grew*." From these *English words* he infers, with Bishop Warburton, "that we "are *obliged* to conclude, that God created the whole "vegetable family, not in a state of *maturity*, but *in the* "*condition of* SEED *previous to germination*;" and because, "*in the ordinary course of nature*," those supposed *seeds* could not have *vegetated* in sufficient time to supply the wants of the graminivorous, herbivorous, and fructivorous animals which were created only two days after them, and which must therefore have inevitably perished through hunger if those days were *natural* days, he further thinks himself *necessitated* to conclude, that the *third day could not have been a natural day*.

But, the whole of this reasoning from which he would thus deduce the "*necessity of the narrative*" to receive his interpretation, is a consequence of arguing fundamentally, and contrarily to his usual learned caution, from a *translation*, instead of from *the original text*. This question rests, absolutely and solely, on a point of *Hebrew idiom* not directly convertible into another tongue, but which has nevertheless been received without any obscurity by those to whom that idiom was most familiar; all of whom have interpreted it with a sense corresponding to that of the memorable passage which I have above quoted from Josephus. The true interpretation, depends wholly upon the proper signification of the Hebrew particle טרם, which our version renders with the adverbial sense of *priusquam, antequam* — "*before it was in the earth* — *before it germi*"*nated*:" whereas, its well-known proper adverbial signification, is that of *nondum* — "*which was not before*, or *as* "*yet*, in the earth — *which had not before*, or *as yet*,

“ germinated[1].” That most profound Hebraist Noldius and his equally profound annotator Tympius, find nothing more intelligible than those phrases in the *original Hebrew* — טרם יהיה — טרם יצמח. The former renders them thus: “ quum omnigenus frutex agri *nondum esset in terra;* et “ omnigena herba agri *nondum effloruisset*[2];” and he thus expounds the import of the passage: “ The sense is, that “ this universe had no other productive principle than the “ *creative word,* or omnipotence, of God alone: all other “ things being excluded which might seem, according to “ common opinion, to have contributed to the production “ of this system of things:—so that the possibility of the “ existence of the smallest plant or herb by *nature,* is here “ denied[3].” And the latter adds: “ The 5th verse is “ intimately articulated with the 6th; viz. ‘ but the plants ‘ of the field *were not yet in the earth* when the mist ‘ ascended.’ The particle *dum—yet,* in the adverb *non-* “ *dum—not yet,* manifestly pertains to the ascent of the “ vapour, which took place before the production of the “ plants. Wherefore, the literal interpretation should be “ this: ‘ at the time immediately preceding that in which ‘ every plant of the field was *about to be in the earth,* and

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[1] “ טרם, cum Fut. *Nondum.*” Castelli, *Lex. Hebr.*—“ טרם h. l. “ vertendum est *nondum*—‘ Omne enim טרם, Raschi inquit, quod in ‘ Scriptura occurrit, significat *nondum,* non verò *priusquam.*’ Sensus “ horum verborum est: terra ab initio omnem fertilitatem suam ab *im-* “ *mediata Dei potentia,* et *inusitato modo,* neque pluvia, neque hominum “ labore accepit.” Rosenmuller, *Schol. in Genes.* c. ii. v. 5.

[2] *Concord. Part. Hebr.* p. 340.

[3] “—Ut sensus sit: hoc universum non habuisse aliud principium “ productivum, quam Dei solius *dictum factum,* seu omnipotentiam: “ exclusis quæ ex sensu communi videri possent aliquid contulisse ad “ hoc rerum συστημα:—ut negetur *per naturam* possibilis vel minimæ “ plantæ vel herbulæ existentia.” *Annot. in Nold. Concord.* no. 1276, p. 882.

' in which every herb of the field was *about to germinate*— ' the mist ascended[1].' "

The elaborate ingenuities are therefore entirely unavailing, which the learned author has dispended upon this passage lest we should be driven to the necessity of supposing, that, in the *creation of vegetation* " a *miracle of* " *germination* should have been wrought, through which " the *vegetable seeds* sprung up almost instantaneously, " and *quite out of the common course of nature,* to complete " and productive maturity." To avoid which extraordinary dilemma (of a *miracle in creation*) he thinks that we have no alternative but to assume, " that the six *days* of creation " *must* each have been a period *greatly exceeding* the " length of a single revolution of the earth round its axis[2]:" that is, as he has already determined, a period equalling or exceeding *six thousand years.*

Our learned author appears to contemplate as a material difference — whether the Creator *created seeds* to grow to trees by the *course of nature* — or, whether He *created trees* in complete and productive maturity[3]; a difference, in which I must confess that I cannot follow him: for, *seeds* which never were in *pods,* are quite as much *out of the common course of nature,* as *trees* which never were in *seeds;* and, both are equally within the capacity of *creative power* to produce. But, that the *tree preceded the seed,* in order though not in time, is expressly declared: for, God did not say — " Let the earth produce *seed* whose tree,

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[1] " Cohæret versus 5 arctissimè cum v. 6, h. m. ' omnis autem frutex ' agri *nondum* erat in terra — cùm vapor ascenderet:'— ergo, *dum* adverbii " *non-dum* manifestè ad vaporis adscensum, qui ante fruticum produc- " tionem contigerit, pertinet. Quare ad literam institui versio hoc modo " debet: ' *tempore* autem *imminente* isti quo omnis frutex agri *adfuturus* ' *erat* in terra, et quo omnis herba agri *erat progeminatura,* &c. *tunc* ' vapor adscendebat.' " *Concord.* p. 340, *note.*

[2] FABER's *Dispensations,* p. 118.

[3] Ib. p. 117.

" and herb, is in them:" — but — " Let the earth produce *tree*, and *herb*, whose seed is in them. And the " earth *did produce tree, and herb, whose seed was in them* " after their kind." It is not possible to mark more positively, the *precession of the tree to the seed*. And, powerful is the reason from *analogy*, why the *latter* should appear to be the *more probable* for the omnipotent Creator to have produced. The learned author denies the analogical argument — that " if *man* and *animals* were originally made " in a perfect or mature state, it is most natural to conclude, that such also was the case with *vegetables*;" and he affirms, " that there is *no parallelism* between the two " matters, and therefore, that no argument can be drawn " from an *imagined analogy*[1]." I entirely agree with him, in the particular point of view to which he pleases to *restrict* the comparison, namely, to the *insecurity of nascent animals*, and the *security of pregnant seeds*; but, in a more comprehensive point of view, the *parallelism is complete*. *Because* the Creator made *animals* in a mature state, (which our author admits,) the just inference of *analogy* is, that He also made in a mature state the *plants* and *fruits* which were *necessary to sustain them*, and which He had created only two days before; for, otherwise, (as our author himself observes,) they " must have perished " through hunger." The *analogy*, in this argument, cannot be supposed to lie between the subjects in their *differences*, but in their *correspondencies*; and, as the vegetable and animal systems are manifestly *correlative* and *correspondent*, we have here as strong a reason *for plants having been formed in fructiferous maturity*, as the reverend author can assign, *for animals having been formed in vigorous maturity*.

This venerable and zealous writer has thought fit to affirm, that the argument which maintains, "that the *flood* "was produced by means of a *complete interchange of land* "*and water;* so that we are at present dwelling on the "ancient bed of the antediluvian ocean, while the antedi-"luvian continents are now submerged beneath the seas "which roll between our postdiluvian continents; *is so* "*wholly irreconcileable with the Mosaical history both of* "*the antediluvian world and of the deluge itself, in which* "*the four Asiatic rivers are geographically marked out,* "*and determined and identified by postdiluvian characteris-*"*tics*[1], *that it cannot for a moment be admitted by any* CON-"SISTENT BELIEVER *in the Scriptural verity*[2]." I shall oppose no *countercharge* to this somewhat strong and confident affirmation; being thoroughly convinced and satisfied, that those whose opinions are of most weight and authority in this question, will determine equitably, by a comparison of our respective arguments, the points of *consistency*, and *conciliation with the Mosaical history*, thus introduced between us.

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[1] FABER's *Dispensations*, p. 56, *note*.

To enter further into these matters, would lead me far beyond the legitimate limits of this note: my reasons for dissenting *in toto* from the principles of this ingenious writer's commentary on the *Mosaic cosmogony*, and also from those of his *geology*, are sufficiently manifested in the principles and reasoning which govern the *Comparative Estimate*. But I must here, although I am aware that I shall thereby fall, with the two Rosenmullers, into the reverend author's class of "*cursory readers,*" enter my formal and well-considered denial of his *positions* — "that "nothing can be more *indefinite* than the term in Scripture "which we translate by the English word *day;*" and — "that, *in truth,* the term *abstractedly* would be more "accurately expressed by the English word *period* than "by the English word *day:*" because, I think it has been most clearly proved, *that its proper sense in the original language is always definite, denoting an* ACTUAL DIURNAL TIME[1]: *never indefinite, denoting a continuation or length of time, great or undetermined.* At the same time, I shall again remind my reader; that this determination of the philological and critical question, however it may affect our reverend author's *geological theory,* has no operation whatever against his great argument, on the genius and object of the three successive dispensations, PATRIARCHAL, LEVITICAL, *and* CHRISTIAN.

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[1] See *Comparative Estimate*, end of Chap. XIV. Part III., where the *notoriety of the contrary* is shewn, and the consequence fully examined.

[2] FABER's *Dispensations*, vol. i. p. 135, 136.—"One of the various "lamentable consequences of the broken state of Christ's church militant "(observes truly this same sensitive and amiable writer) is this:—good "men are apt, in the present world, *to view each other with distrust.*— "They *know not each other;* and therefore they judge of each other *un-*"*fairly and harshly.* But, in heaven, this misunderstanding will be "rectified." *Ib.* vol. ii. p. 431, 435.

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[1] Both Josephus (*Ant. Jud.* lib. i. cap. 1) and Philo (*de* Κοσμοπ. tom. i. p. 3 and 7) have remarked, that Moses, in recording the *first day* of Creation, does not employ the *ordinal* but the *cardinal* number.—"*the evening* "*and the morning were* ONE DAY, יום אחד." So also the LXX, ἡμερα μια; and so also the Chaldee Paraphrase, "*dies unus.*" Origen observes—"He "does not say, the *first day,* but, *one day;* because, *time* existed not "until the *world* existed. But, time began to exist in the following "days; for, *the second, the third, the fourth,* &c., designate the *progress* "*of time.*—Non dixit, dies *prima,* sed dies *una;* quia *tempus* nondum "erat antequam esset *mundus.* Tempus autem esse incepit ex consequentibus diebus: *secunda, tertia, quarta,* et reliquæ omnes, *tempus* "*incipiunt designare.*" (Homil. 1. *in Genes.* Interpret. Rufino.) The following annumerated days, are therefore repetitions of the model of the first "*one day*" which, Philo observes — "completed the *measure of the* "*time of a day:*" κατα το αναγκαιον του χρονου μετρον ενετελειτο, ὁ και ἡμεραν ὁ ποιων εκαλεσε. (*ubi sup.*) To deem that *measure* insufficient for the *operations* declared to have been transacted in them, is, if the *operating Cause* be duly calculated, a judgment very far from *philosophical;* and it is, at the same time, not very consistent, either with a *Jewish* or a *Christian* profession of *belief.*

NOTE [II.]

On the Jubilean Chronology of FRANK.

THE Reviewer in the *Journal of Science*, No. xxix. p. 126, has expressed a " wish, that the *Comparative* " *Estimate* had given the result of Frank's attempt, to " construct a true fundamental Chronology founded on " the *Period of the Jubilee*, to which it alludes." To give the whole result, chronological and historical, of Frank's labours, would be altogether impracticable in this work: in order however to meet, as far as it is practicable, the wish of that respectable writer, and of all others who may take a part with him in it, I shall here, in this second edition of that work, endeavour to present a brief view of the learned German's important undertaking[1].

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[1] " PRÆLUSIO CHRONOLOGIÆ FUNDAMENTALIS, &c., à JOHANNE " GEORGIO FRANK, *Superint. Dioeces. Hohnsted. et Membro Ordin. In-* " *stituti Regii Hist. Goettingens.*"—Goettingæ, 1774.

" Epitome operis magni et ampli (says the learned Editor), in quo " efficiendo FRANKIUS noster, vir senio ac munere non magis quam " meritis doctrinaque venerabilis, et inter principes Chronologorum non " hujus tantum ætatis, sed reliquarum etiam omnium merito nu- " merandus, plus triginta annorum operam studiumque consumpsit.— " Rogat itaque auctor, rogamus et nos, immo provocamus omnes hujus " ætatis Chronologos, ut quid de instituto FRANKIANO sentiant, aperte " pleneque dicere haud graventur.—*Juliana Periodus*, qua adhuc, " necessitate coacti, utimur, artificialis tantum, et Julianis annis accom- " modata est; contra, *Periodus Iobelea* historica est et tropica: et erit tum " etiam Julianæ Periodo anteponenda, si, præter omnem spem atque " expectationem, non *historico-biblica* esse deprehendetur; EST ENIM, " ATQUE MANEBIT, TROPICA." Præf. I. C. GATTERER, *August. Magn. Brit. Regis à Consil. Aul. Histor. Professoris Goetting.* &c.

His treatise, is divided into two chapters; the first of which, entitled, "*de Chronologia Iobelea Technica,*" exposes the powers of the JUBILEAN PERIOD as a rule for computing and harmonising *time*, in its divisions of *years, months,* and *weeks:* the second chapter, entitled, "*de* "*Chronologia Iobelea Historico-Biblica,*" applies that rule, generally, to the Sacred History from the Creation; but, specially, to the Jewish History, from the commencement of the Hebrew polity in Canaan to the death of OUR LORD, and extends it to the destruction of Jerusalem by Vespasian, as the concluding term of the 70 weeks of Daniel. It is to the first of these chapters only, that I am able here, though very summarily and imperfectly, to advert; in which chapter, the author shews, (according to the terms of his learned Editor,) that the "JUBILEAN CYCLE *is,*" in the established order of things, "*and must* "*ever continue to be,*" truly "*tropical;*" that is, *perpetually recurrent,* so long as that established order shall continue to subsist. But, in abridging the argument, I must unavoidably alter, in some respects, the order in which it is presented by its author.

"The Jubilean Period (says Frank), is a *Cycle* of *seven* "*times seven,* or *forty-nine* luni-solar years, which, by "means of Epacts, marks out years, months, and days, "according to the courses of the Sun and Moon, in per-"petual and equal revolution. That Period, has this pre-"eminence above all others; that it was taught by God "Himself to the people of Israel, and was delivered to "them from Him by Moses. For, thus said God to "Moses: 'Thou shalt number seven sabbaths of years 'unto thee, seven times seven years; and the space of 'the seven sabbaths of years shall be unto thee *forty and* '*nine years.* Then thou shalt cause the trumpet of the 'JUBILEE to sound, on the tenth day of the seventh 'month; in the day of atonement shall ye make the 'trumpet sound throughout all your land. And ye shall 'hallow *the fiftieth year*, and proclaim freedom throughout 'all the land unto all the inhabitants thereof: it shall be 'a JUBILEE unto you: and ye shall return every man 'into his possession, and ye shall return every man unto 'his family[1].'"

A long and tedious controversy was carried on throughout the last two centuries, respecting the *fiftieth Jubilean year*. Some learned writers maintained, that it was the 49th year, with the year of the preceding Jubilee counted to the number; others maintained, that it was the year following the 49th year: some contended, that it was the lunar year, others, that it was the solar year. A catalogue of the principal advocates for these several opinions, may be seen in—"*Tractatus de temporibus et* "*festis diebus Hebræorum*," (cap. 18. § 5.) of I. MEYER; which tract may be found in the "*Thesaurus Antiq.* "*Sacr.*" of UGOLINI, tom. i. p. 702.

But, the grounds taken by those learned disputants, could never decide the point at issue. By confining themselves to the simple questions—whether the Jubilean year was the 49th *or* the 50th, whether the lunar *or* the solar year?—they argued out of the field which could alone supply the solution.

For, the Hebrews employed, *conjointly*, the two methods of computing time, *lunar and solar*. Their months were computed by the *New-Moons*, 12 of which completing the *lunar year*, embraced only 354 days; and this year, being shorter than the solar year by about eleven days, the 1st month, or beginning of the year, naturally receded, in that measure of time, through all the solar seasons.

Whereas, their *Sabbatical Years* had their beginnings and endings fixed and determined to the solar seasons; and comprised a solar year, of 365 days.

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[1] Leviticus, xxv. 8, 9, 10.

The lunar year, therefore, was shorter than the solar, by 11 days; but, those 11 days being added to the lunar year, brought lunar time into equation with solar time, and constituted the years of the Jubilean Period, or Cycle, *luni-solar years.*

Our learned author shews, by the recorded *year of the Deluge,* that it was computed by the *luni-solar year,* employed in the Jubilean computation. This will appear in the annexed *Table;* in which it will be seen, that the year of the Deluge was a solar year of 365 days, viz. from the 17th day of the 2d month A.M. 1656, to the 27th day of the same month, A.M. 1657. But, its months, computed by the moon, completed their year in 354 days; viz. from the 17th day of the 2d month, A.M. 1656, to the 16th day of the same month, A.M. 1657. The eleven days (from the 16th to the 27th), remaining for the latter year to equalise the difference, forms its *epact* or supplement, and constitutes it a luni-solar year[1]; the difference between the lunar and solar year, being 10 d. 21 h. 0′ 15″ 52‴.

Now, 49 solar years are equal to, and embrace, 50½ simple lunar years, whose progress proceeds with the solar progress; consequently, there is *both a lunar and a solar progress* to be considered, in determining the year of the *Jubilee.* And, as God fixed the *commencement* of the Jewish year according to the *lunar index,* but its *festivals*

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[1] So also Rosenmuller, *in Genes.* viii. 14: "Since, as Michaelis observes on the passage, the Deluge began on the 17th day of the 2d "month, it lasted one entire year and 11 *days;* which year, if it was a "lunar year, as probably it was, and if those 11 *days* be added to it, the "duration of the Deluge was an entire solar year." Frank alone, has seen the full importance of this observation.

TABLE.

YEAR OF THE DELUGE.
A.M. 1656.

Lunar.		*Solar.*	
Months.	*Days.*	*Days.*	
2	17 13	....	17th day of the 2d month, on which day Noah entered the Ark, and the Deluge commenced.
3	30		
4	30	150	days, during which the waters were upon the whole earth, until the 17th of the 7th month.
5	30		
6	30		
7	17 12		17th day of the 7th month.
8	29	71	days, to the 1st day of the 10th month, when the summits of mountains appeared.
9	29		
10	1 28		1st day of the 10th month.
11	11	40	days, from the 1st day of the 10th month until the day when Noah sent forth the raven.
	7	7	days, after which Noah sent forth the dove.
	7	7	days, after which he sent it forth a second time.
	4		
12	3	7	days, after which he sent it forth for the last time.
	26	26	
(1657) 1	30	30	
2	16	....	day, concluding the *lunar year* of the Deluge.
	354	27	27th day of the 2d month, 1657, on which day Noah went out of the Ark.
		365	days, from the beginning to the end of the Deluge; being equal to a *solar year*, and exceeding the lunar year by 11 *days*.

according to the *solar seasons*, regard must be had to *both computations* in attempting to determine the question of the *fiftieth year;* since, the *computation* of the festivals by lunar time, but their *determination* by solar time, necessarily implies some method of equalising the differences of the two; and it may therefore be, that the numeration of the *50th year* may not have relation to the computation of the lunar years *considered in themselves*, nor to that of 49 solar years, but to that of the *lunar years in their equation with the solar.*

This is the ground discerned by the sagacity of our Chronologist, for putting an end to the controversy so long, so equally, and so undecisively continued; and which he thus learnedly determines. He contends, with great penetration and ability, that this period of *Civil restitution*, was no less a period of the *restitution of Time to its primitive Order*, by equation of the differences accruing from the varying progresses of the Sun and Moon; *both* which great luminaries had been originally and expressly appointed by God, to " *be for years.*"

" That the Jubilean measure of time was a *Cycle* of " time, has never been called in question; but, it has " been made a point of controversy, of how many, and of " what years, that Cycle consists; some supposing it to " consist of 50, others of 49 years; some, of lunar years, " others, of solar years; which controversy is easily to " be determined. For, if the Jubilean measure is a *Cycle* " of time, it must consist of a number of years fixed by a " rule which shall constitute a *revolution* of that number. " But, who can affirm this to be the case of the time of " 50 years? Those years constitute, indeed, a *space* of " time, but not a *revolution* of time. Whereas, 49 years " constitute such a *revolution;* for, being computed by " *seven*, they always terminate in the Sabbatical year, as " in a circle. Hence it is evident, that the *Jubilean*

" *Cycle* consists of 49 years. This fact God Himself " signifies, when He expressly says: 'Thou shalt number ' seven Sabbaths of years; and the *seven Sabbaths* of ' years, shall be unto thee *forty-nine years.*' But, the " *season of the year* in which this Cycle, and all its years, " began, will be best determined by the beginning of the " Sabbatical and Jubilean years; for, since these began " in the season of *autumn,* after the gathering in of all " the fruits of the earth, it necessarily follows, that the " Cycle itself, and all its years, began in the season of " *autumn.* Wherefore, the 1st day of the 7th month, " (Tisri, *Sept.* and *Oct.*) which was the first day of the " Hebrew *civil year,* was celebrated as the beginning of " the year.

" That the years of this Cycle are to be numbered " according to *lunar* months and years, is manifest, both " from the years of the Cycle, of which 50½ constitute " 49 solar years, and begin from the 7th month of the " lunar year; and also, from the universal Biblical computation of *months,* which are numbered from the *New-* " *moons:* nay, it is manifest, from the ordinance itself of " God, that the *years* were to be computed according to " lunar months. (Exod. xii. 2; xiii. 4; xxxiv. 18.) But, " that the years of the Jubilean Cycle are not to be computed by *mere lunar* years, but by *intercalated* or *luni-* " *solar* years, may be perceived, partly by the *beginning,* " and partly by the *end,* of that Cycle. For, all the years " of the Cycle were to have a *fixed and determinate beginning,* namely, the 7th autumnal month; which could " not have been the case if they had been *mere lunar* " *years,* since in their revolution they would have passed " through all the seasons of the year. The same is " equally manifest from the *end* of the Cycle, which was " ordained to be a *secure and exact rule of time,* by which " the years and sacred days might be duly defined, and " kept in equal relation to the course, not only of the

" moon, but also of the sun; which could not have been " effected, if the Cycle had consisted of mere lunar " years, which are shorter than those of the sun, and in " 32 years recede from the latter one entire year. How, " then, could the Jewish festivals have been celebrated, " by such a rule of computation, at fixed and unvarying " seasons?"

The learned author proceeds to argue, that the year denominated in this place of Leviticus, *the fiftieth year*, was neither the 50th *mere lunar year*, nor yet the next solar year following the 49th *solar year*; but, that it was " the fiftieth, or rather part of the 50th lunar year " prolonged and intercalated, and thereby rendered *luni-* " *solar*," which always coincided with, was included in, and identified with, the 49th solar year, at the recurrent period of the Jubilee; and, by that coincidence, constituted a *Cycle*, by means of which the differences of lunar and solar time constantly adjusted themselves. " That " it was, therefore, not only a year of intercalation, but " also a year of reduction, in which the civil lunar years " were easily reduced into the natural order of the moon " and sun; because, the *last day but one* of that year coin- " cided accurately with the moon, and the *last day* with " the sun. That it was called by God, שנת חמשים שנה, ' *the year of the fiftieth year*[1],' because the 50th lunar " year was included in the 49th solar year, and the Jubi- " lean year in the 50th lunar year. For, the 50th lunar " year begins with the seventh month of the 48th solar " year; but the Jubilean year, which is also the 49th " solar year, begins with the 11th day of the 7th month of " the 50th lunar year, and reaches to the 7th month of " the 51st lunar year. Hence, the Jubilean year is not " the entire lunar year, but only a part of it, consisting of

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[1] So, perhaps, it should be read in the Greek of Lev. xxv. 10. ἁγιασατε, το ετος του πεντηκοστου ενιαυτου, not, το ετος τον πεντηκιαστον ενοαυτον.

" the last six months of the 50 lunar years, and the first
" six months of the 51st. For, we are here to apprehend
" a two-fold computation of the lunar year; the one from
" the (first) month *Nisan* (*vulg*. March[1]), the other from
" the (seventh) month *Tisri* (*vulg*. September)[2]."

" *Astronomical Computation.*"

Days. Hours.
(1) $17363+23+43' = 49$ nat. lunar years.
$177+4+24 =$ 6 syn. months, of 29 d. 12 h. 44′ 3″ 11‴.
$354+8+48 =$ the Jubilean year.
$17895+12+56 = 50\frac{1}{2}$ nat. lunar years.
$17896+20+56 = 49$ nat. solar years.
$1+8+0 =$ Jubilean epact.

The 177 days of the 6 synodical months and the 354 days of the Jubilean year, making together 18 months, are equal to the sum of epacts of 49 years, *minus* 1 d. 8 h.; or, 532 d. 21 h., *minus* 1 d. 8 h.

Days. Hours.
(2) $17896+20+56'+9''+6''' = 49$ nat. solar years.
$17363+23+43+11+48 = 49$ nat. lunar years.
$532+21+12+57 \quad 18 =$ epacts of 49 years.

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[1] " Nisan, (says Michaelis) the first month of the Hebrews, is not " *March*, as it is generally represented in the lexicons; but, as far as " lunar time can be reconciled with solar time, *April*. See my Commentary *de Mensibus Hebræorum*, which is the eleventh of those read in " the Goettingen Society of Science, and which I have published separately." *Suppl. ad Lex. Heb.* no. 1585.

[2] The first day of the first month, *Nisan*, and the first day of the seventh month, *Tisri*, were each the first day of a Hebrew lunar year, according to two different computations: the latter, was the ancient patriarchal year used by the Hebrews before the Exode, and which continued to be the Hebrew *civil year*; the former, was the sacred or *ecclesiastical year*, ordained by God after the Exode. It is very observable, that the *tenth day* of the *first month* of both these *lunar years*, was signalised as sacred (Exod. xii. 3. Lev. xxv. 9.); which *notation*, appears to carry with it a very strong evidence of the *intercalation*.

Days. Hours.
(3) $354+8+48'+38''+12'''$ = a nat. lunar year.
$177+4+24+19+6$ = 6 synod. lunar months.
$531+13+12+57+18$ = 18 synod. months.
$532+21+12+57+18$ = epacts of 49 years.
$1+8+0+0+0$ = Jubilean epact.

He shews, by the following *Table*, that the epacts or fractional differences remaining at the end of each Cycle, and which proceed in the fixed progression of 1 *day* 8 *hours* in a month of 30 days, are easily computed; are reduced to 16 hours, in the 23d Cycle; and are totally absorbed in the 45th, which last, therefore, constitutes "*a fundamental and most perfect Cycle*, or *period of* "*Epacts, remaining always equal to itself; and, by means* "*of which, the astronomical epacts for every year of the* "*world may easily be found.*"

TABLE OF JUBILEAN EPACTS.

Tab. IV.

Cycl. Iob.			Cycl. Iob.			Cycl. Iob.			Cycl. Iob.			Cycl. Iob.		
	d.	*h.*		*d.*	*h.*		*d.*	*h.*		*d.*	*h.*		*d.*	*h.*
1	1	8	10	13	8	19	25	8	28	7	8	37	19	8
2	2	16	11	14	16	20	26	16	29	8	16	38	20	16
3	4	0	12	16	0	21	28	0	30	10	0	39	22	0
4	5	8	13	17	8	22	29	8	31	11	8	40	23	8
5	6	16	14	18	16	23	0	16	32	12	16	41	24	16
6	8	0	15	20	0	24	2	0	33	14	0	42	26	0
7	9	8	16	21	8	25	3	8	34	15	8	43	27	8
8	10	16	17	22	16	26	4	16	35	16	16	44	28	16
9	12	0	18	24	0	27	6	0	36	18	0	45	0	0

He further shews, that this Cycle, being *founded on the hebdomadal division of days*, necessarily keeps all the three computations of time, *solar, lunar,* and *hebdomadal,* to their primitive rule, as they had proceeded at their commencement in the *first day of creation;* in which first day, which was also the *first of the first week,* " *the* " *moon was in that conjunction with the sun, that, on the* " FOURTH DAY, *when it was brought forward by God in* " *the heavens, it appeared illuminated at sun-set, as it now* " *naturally does on the* FOURTH DAY *after every* NEW-" MOON ; *and from thence it follows, that the* FIRST NO-" VILUNIUM *or* NEW-MOON, *coincided with the* FIRST " DAY *of* CREATION."

" But, the *use* of this Period (observes this pious and " skilful Chronologist,) does not pertain to the Jews " alone, although it was specially prescribed to them; its " use is universal. It not only determines most accu-" rately the *Paschal Term,* or feast of Easter, with a pre-" cision greatly surpassing that of the Gregorian Compu-" tation; but, it extends to all times, and serves for an " universal rule of time—*pro norma temporis universali:* " which renders unquestionable the importance of the " Period. For, it does not merely furnish a means for " regulating *months* by epacts; but, it circumscribes and " determines by its limits, *years, weeks,* and *days,* and " moreover contains in itself all the notable Cycles of " time.—The ordinary Cycles which Chronologists em-" ploy for determining years, months, and weeks, are the " Cycle of the *Moon,* of the *Sun,* and of the Julian or " Gregorian *Epacts.* All those Cycles are comprehended " in the Jubilean Period; which is evident, since the " *number* of those Cycles for any year, may be found, by " dividing by them the number of the year of the Jubi-" lean Period." All which propositions he industriously and ably establishes by numerous minute expositions and calculations, and by various chronological and historical *Tables* elaborately digested; to which I must of necessity refer the reader.

"This (he adds) might suffice to prove, that God did "not impart this Cycle to His people for political and "civil uses only, but also for chronological; that it "might serve them for a *rule*, or *canon*, by means of "which they might reckon years, months, and weeks, "without any art, and merely mechanically. And, it is "no contradiction to the Sabbatical appointment of the "Jubilee, that the *Jubilean Period itself* had commenced "with the first year of the World; because, it is essentially founded on the motions of the Sun and Moon. "For, though the *Period* already existed, and continues "through all time, yet the art of computing by it was "unknown; but God Himself taught the Jews to compute their years according to it, and by it to sanctify "the year of JUBILEE. Hence, we may rightly distinguish, between the *Mundane*, and the *Judaical*, Jubilean "Period. The former, began with the Creation of the "World, and runs on through all times; the latter, pertains to the times of the Jewish State, and embraces 30 "Jubilean Cycles, from the division of lands in Canaan "to the death of CHRIST. This last event, concludes "the *Historical* Jubilean Period, but, the *Chronological*, "as it began with the Creation, so it must continue to "the Consummation; and accordingly, all events occurring in the series of times, may be marshalled and "regulated by it, as the *most perfect rule of time*.

"Since, then, such is the extensive use of the JUBILEAN PERIOD, that, by means of it, *years*, *months*, "*weeks*, and *days*, may be accurately defined throughout "all time, the various epochas fixed to certain terms, and "most chronological problems solved; no one can doubt, "that it is a *fundamental period of time*, to which the "events transacted throughout all time may be punctually "referred. And, since the Sacred Scripture itself has "delivered to us this Period, excelling all others, and "manifestly divine, we may discern by it, both the excellence and the divine origin of that Sacred Scripture: "an issue, which must cover with shame those who, "through ignorance or malignity, charge the Chronology "of Scripture with falsity or confusion; since, from what "has been said, it most lucidly appears, that it is most "excellent, and the *base and foundation of all Chronology*."

And he thus concludes: "Although this laborious "work of *Jubilean Chronology*, which I have drawn out "here as in a Compendium, exhibits the most accurate "method of computing times and years according to the "Sun and Moon; yet, I do not so much produce it with "a view to introduce a new method for determining years, "in present and in future times, as to place in its fullest "light *this great Truth*:—that the Chronology of the "Bible is *most perfect*, and *truly fundamental*, and is "clear from all errors and real contradictions: the establishment of which *Truth*, must unquestionably add "very considerable weight to the evidences, which prove "the *divine origin of the* Sacred Scripture."

According to the computations of this laborious and venerable Calculator, "the birth of our Lord took place in "the year of the World 4181, conformably to the computations of Petavius, and some other late Chronologists;" that is, in the "16th year of the 30th *Judaical*, or 86th "*Mundane*, Jubilean Cycle." The following year 4182, is the *epocha*, or first year, of the Christian *era;* consequently, by the same computation, we are now (A.D. 1825,) in the 28th year of the 123d Jubilean Cycle from the Creation; and, as A.D. 1819, was A.M. 6000, we are now in the 6th year of the *Seventh Millenary of the World.*

Thus then we perceive, that such a compound and harmonising *Cycle of Times* as has here been shewn by Frank in his analysis of the Jubilean Period, is actually and continually proceeding; that it has invariably proceeded, from the beginning of time; and, that it must continue to proceed, until its interruption, suspension, or termination, by the Will of Him who first ordained its revolution and periodical coincidences. And thus, we are able to contemplate *Time,* in its parts and in its entireness, and our own position in *Time,* distinctly and without any obscurity or confusion.

The interpretation of the *Jubilean year* which has been here given by Frank, appears to derive a very remarkable collateral testimony from the Septuagint version of the first clause of the 11th verse of the chapter of Leviticus cited at the beginning of this note; a testimony the more interesting, as it appears to have entirely escaped the observation of that industrious Computator. That clause, in our English translation, is rendered —" a Jubilee *shall* " that 50th year *be* unto you" — because, it stands thus in our Hebrew texts —יבל הוא שנת החמשים שנה תהיה לכם. But, the Septuagint render the clause thus: *αφεσεως σημασια αυτη· το ετος το πεντηκοστον* ΕΝΙΑΥΤΟΣ *εσται ὑμιν* — which rendering, the Egyptian version of the Septuagint thus remarkably illustrates: " Signum remissionis vobis *est hoc;* nempe, " *annus quinquagessimus erit vobis* (ⲡ ⲟⲩⲣⲟⲙⲡⲓ ⲉⲥϫⲏⲕ " ⲉⲃⲟⲗ[1]) ANNUS PERFECTUS — the token of remission " *is this; the fiftieth year shall be unto you a* PERFECT " YEAR." By which interpretation, it gives us the true intention of ενιαυτος in the Greek, *sc.* εν ἑαυτῳ[1], or a *perfect annual cycle of time.* The cause of this variation in the readings, is very obvious; where our present Hebrew copies read תהיה—*erit, shall be,* the copies of the Alexandrian interpreters evidently read תמים[2],—*perfectus, perfect* or *complete;* thence, εν ἑαυτῳ; and thence again, in the Egyptian, ϫⲏⲕ ⲉⲃⲟⲗ—*perfectus.* Without pursuing the critical inquiry, which of the two readings is most probably the primitive reading; it appears manifest from the interpretation of the Greek, even supposing it to be incorrect, that the Jews, in the time of Ptolemy Philadelphus, held the Jubilean or *fiftieth* year to be a *full, perfect,* or *defining year,* coinciding with the 49th or seven times seventh solar year. The phrase, "*shall be a* "*perfect year,*" seems to be applicable only to a form of year *liable to relative imperfection,* and therefore, only to a *lunar year.* Had the *Jubilean year* been a *perfect solar year,* in natural sequence, by the ordinances of the heavens, the terms of the divine mandate would appear to have been without force or application; but, in *providing a perpetual Period* which should, by Divine Artifice, harmonise the natural indices of the *Sun* and *Moon* with the moral index of the *Seventh Day,* God has manifested Himself to be the Author and Regulator equally of *all the Three:* the *two natural indices* being subjected, in that Period, to the rule of the *moral index.*—*Physicis id trado concoquendum.*

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[1] " ϫⲏⲕ ⲉⲃⲟⲗ, *πληρος, plenus, τελειος, perfectus, plenitudo.* " ϫⲱⲕ ⲉⲃⲟⲗ, *consummatum est; περας, terminus, τελος, finis;* " *πληρωμα, perfectio, plenitudo.*" *Lex. Ægypt.* Scholtz. p. 165, 170.

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[1] ενιαυτος, εν ἑαυτῳ. *Etymol. Magn.*—ενιαυτος, ἡλιου περιοδος, περιελθοντος εξ ὡρων εις ὡρας του θεου, κυκλῳ του αστερος περιδραμοντος. *Onomast.* JUL. POLL. lib. i. cap. 7.

[2] "תמם, *consummationem* et *complementum* rei exprimit; *finitus,* "*consummatus, completus, integer factus, perfectus est.*—תמים, *perfectus,* "*integer,* sive *physice,* sive *moraliter.* Aliquoties adverbialiter, *integre,* "vel substantive, *integritas:* ut, Jos. xxiv. 14. Jud. ix. 16, 19, &c." *Lex. Heb.* SIMON: etiam CASTELL.

The origin of the Hebrew word יובל—*Jobel*, has actively exercised the etymological researches of Hebrew philologists and lexicographers. Some, would derive it from יובל—*jobel*, a *ram's horn*, as denoting the "*trumpet*" which was to proclaim the Jubilee. (Castell. D. Levi, and the Rabbins.) "Ex voce Hebraica *iobel*, id est "*cornu, quo promulgabatur Iubelæi annus:* ita Liranus, "R. Salomon in cap. xx. Lev.[1]" But, this etymon is refuted by the observation of Michaelis, that "it is notorious "that the Jews distinguished three kinds of trumpets — "שופר, חצוצרה, יובל[2]." Now, as the *trumpet* which was to proclaim the Jubilee, is expressly declared, in the passage of Leviticus, to be the שופר, and therefore *not the* יובל, that conjecture cannot hold its ground. Others, would derive it from יבל, *fluxit*, and would understand it — "denotare sonum continuo profluentem et instar fluminis "se diffundentem." (Simon.) Some, would derive it from יבול, *fructus, germen*, fruit, because the earth was not tilled in the Jubilean year, but brought forth its *fruits* miraculously; (or, as physics would say, *naturally*). Others, would derive it from יבל, which, in the conjugation Hiphil, is said to signify, *adduxit, abduxit, deduxit, reduxit*[3]; and these would interpret it to signify, a *reduction* or *abduction* from captivity, and thence, a *remission from servitude*. Our learned chronologist, also, has been led by his subject to derive it, but with a different application, from the same commonly assumed sense, *adduxit, reduxit*—" quod parem " significationem cum verbo Græco επαγειν, à quo nomen " *Epactæ* deducitur, habet; quare annus Iobelæus idem " est ac annus επαγομενος," (or *Leap-year*). Michaelis says, " in lexica, יובל *cornu arietis* receptum, sed reliquis " linguis Orientalibus plane ignotum, quarum nulla *arie-* " *tem* ita vocant: commentum Rabbinorum, quod repeti " aut credi non decet, donec commenti suspicione libe- " retur, ejusque certa exempla ex linguis Orientalibus " adferantur. *Est tamen perantiquum:—nec quidem de* " *etymo certi quid habeo*[1]." From hence it is evident, that we have still to seek the origin of the term.

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[1] *Hiero-Lexicon*. Romæ, 1677, p. 337.

[2] *Suppl. ad Lex. Heb.* no. 949.

[3] It is an erroneous statement, that יבל, in הוביל, ever signifies, either *abduxit, adduxit, deduxit*, or *reduxit*. It signifies simply, *duxit, αγω, πομπευω* — to *lead*, or *escort;* and the determinations, *ab, ad, de, re*, are solely given by the particles which may happen to precede or follow it. The confusion has arisen from the Latin and Greek modes of expression, *abduco ab, adduco ad, deduco de;* and from ascribing, after those models, the sense of the *separate particle* to the *verb itself*, which always preserves its simple primitive sense *αγω, duco*.

To guide us, however, in that search, we have two governing reflections to make, which appear to have been wholly overlooked in the former learned attempts: 1. That the term appears, for the first time, in the words of the divine ordinance; and that it is, in fact, enounced to the Hebrews for the first time by *God Himself*, who is pleased to *assign* that new and particular denomination to the *Great Festival* which He institutes to recur at the end of every seventh hebdomad of years. 2. That the *most ancient information* we can obtain of the *received import* of the term, is that imparted by the Alexandrian interpreters; who never employ the term *Jobel* itself, but always, the interpretations, αφεσις, ἱλασμος, or the periphrasis, αφεσεως σημασια. Hence, the meaning of the word *jobel*, is to be understood by us in the same sense in which it was understood by the *earliest Hebrews whom we can consult*; and it cannot, therefore, have any relation to any of the divers objects, to which the ingenuity of modern etymologists would refer it.

Now, we find no *root* יבל, of the same import as αφεσις,

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[1] *Suppl. ad Lex. Heb.* no. 949.

ἱλασμος, in the Hebrew, or in its kindred tongues. But, it is most remarkable, that we find all the various interpretations employed in the Greek version made *at Alexandria* —*αφεσις, αφεσεως σημασια, ἱλασμος*, rendered uniformly in the *Egyptian* version, by ϫⲱ-ⲉⲃⲟⲗ—*jo-ebol;* which words signified, in the native tongue of Egypt, ϫⲱ, *jo*—*ponere*, ⲃⲉⲗ, ⲃⲟⲗ, ⲉⲃⲟⲗ, *bol*—*ex, extra*, and in compound, the “ *αφεσις, remissio, αφιεναι, remittere, ἱλασμος, propi-* “ *tiatio*[1],” of the Alexandrian translation. The 10th day of the 7th month in every hebdomad of years, was to be a day of *atonement*—הכפרים, but in every seventh hebdomad of years, the year was to be proclaimed on that day, *jobel*—יבל. But, in the Egyptian version, it is called in both periods ϫⲱ-ⲉⲃⲟⲗ, *jo-ebol;* and, in the Greek *ἡμερα ἱλασμου*—*ενιαυτος αφεσεως*. In the verse above quoted from the Egyptian, the Latin version of which was given—“ signum *remissionis* vobis est hoc, annus “ quinquagessimus erit vobis *annus perfectus;*” the original has—“ signum ϫⲱ-ⲉⲃⲟⲗ, *jo-ebol*, vobis, &c.;” and, generally, before the assignment of the term *Jubilee* in the Hebrew, where הכפרים, *atonement*, occurs in the Hebrew text, it is rendered ϫⲱ-ⲉⲃⲟⲗ in the Egyptian, as its proper expression in the latter tongue, (Lev. iv. 20; 26, 31, 35; ix. 7; xxiii. 27, 28.) And, in xxv. 9, "the "day of *atonement*," which is then first declared in the Hebrew to be the day of *Jubilee*, and which the Hebrew still expresses כפרים, is rendered in the Egyptian, ϫⲱ-ⲉⲃⲟⲗ —*jo-ebol;* which shews כפר, *atonement*, to be the Hebrew interpretation of the new denomination *Jo-bel*, then first introduced into the Hebrew vocabulary by the special assignment of God.

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[1] *Lex. Ægypt.* Scholtz. p. 116.—“ Verba Ægyptiaca vocales sæpe “ mutant—ultimæ syllabæ verborum frequenter mutantur.—Varietas “ hæc vocalium inde videtur orta, quia Ægyptii vocales olim promiscuè “ per lineolam supernam expresserunt, ut ⲃⲗ, quod etiam ⲃⲉⲗ, “ ⲃⲟⲗ, et ⲃⲱⲗ scribitur. (*Gramm. Ægypt.* Scholtz. p. 75, 77.) “ ⲃⲉⲗ, ⲃⲏⲗ, ⲃⲟⲗ, ⲃⲱⲗ, *λυσις, solutio, αναλυσις, disso-* “ *lutio.* (*Lex. Ægypt.* p. 12, 13.)—ϫⲱ significat *ponere*, et ⲃⲟⲗ “ *extrà*, unde *ponere extrà, ejicere, dimittere.* (*Thes. Epistol.* Lacroz. “ tom. iii. p. 74.) Literam χ Græci aliquando, et Ægyptii pronunciant “ ut ϣ (*sh*, vel *j* Gallicum, *jour.*)—ϣ et ϫ inter se commutantur.” Præf. Georgii, *ad Fragm. Ev. Sti. Johann. Græco-Copt. Theb.* Romæ, 1784. p. 41, 155.

It had been solemnly enjoined by God to the Hebrew people, immediately on their deliverance from Egypt (Deut. v. 15), to "REMEMBER *that they were servants in* "*the land of* EGYPT, and that the Lord their God *brought* "*them out thence*, through a mighty hand, and by a "stretched out arm; and that He therefore commanded "them to keep the *Sabbath-day*," on which day He had brought them out. When, therefore, He instituted the great Sabbath of the JUBILEE, "the acceptable year of "the Lord for giving deliverance to the captives;" He appears to have secured the REMEMBRANCE *of the Egyptian captivity and deliverance*, by affixing to that year the well-known *Egyptian term* JO-EBOL, JO-BOL—*remissio*,—rendered JO-BEL in the Hebrew utterance: by which denomination, the record of their emancipation from *Egyptian servitude* became engraven in the ordinances of their Law, and was periodically recalled to their remembrance; and thus, was rendered perpetually *monumental* of the transaction, which they were commanded to "REMEMBER." And, the remarkable, and evidently intentional *avoidance of that term* by the Jews of Alexandria, in a translation made by order of a *sovereign of Egypt;* may, very probably, have proceeded from a national pride, which was averse to record before the Egyptians, the divine imposition of a name derived from the language of their country. It is well known, that the Hebrews received many words from the Egyptian tongue during their long abode in Egypt, as they afterwards derived many from the Chaldee during their captivity in Babylon: "Lingua "Ægyptia multa Hebræis verba dedit," says Michaelis (*Suppl. ad Lex. Heb.* no. 996).—"Quam multæ voces" (exclaims the learned La Croze,) "extant in ipso He-"bræorum *Pentateucho*, quæ præter illas, quas viri quidem "eruditi jam observarunt, ad linguam Ægyptiacam et "possunt et debent revocari." (*Thesaur. Epist.* Lacroz. tom. iii. p. 242.)

It may be of some interest to many of my readers, to know; that the *Jubilee* of the Roman Church, observed in the present year, 1825, has no retrospect to the *Hebrew Jubilee*, but only to the *Annus Secularis* of heathen Rome. "Causam Jubilæi non eam fuisse dicimus, quam aliqui "dixere, ut nempe *Synagoga* imitaretur; sed potius *quid* "*semper Pontifices vanas observationes Gentilium in sacras* "*cæremonias erga Dei cultum convertere conati sunt*, ideo "ad tollendum *superstitiosum Romanorum Secularem An-*"*num, Annum Sanctum indulgentiis* Romani Pontifices "instituerunt[1]. The cause of the Jubilee was not that "which some have alleged, namely, to imitate the *Syna-*"*gogue;* but rather, *as the Roman Pontiffs always endea-*"*voured to convert the vain ceremonies of the Gentiles into* "*sacred ceremonies of Divine worship*, so they instituted a "*year sacred by indulgences*, to do away the *superstitious* "*Secular Year of the Romans.*"

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[1] Hiero-Lexicon, &c. fol. p. 337, Romæ, 1677: *Superiorum Permissu et Privilegiis.*

Note [III.]

On M. Humboldt's *Theory of Rocks.*

In the "*Geognostical Essay on the Superposition of Rocks in both Hemispheres,*" this Herculean explorer,

> "Emensus longi claviger orbis iter,"

has embodied, not only the observations of his own extraordinary personal experience, but that also of all the ablest and most celebrated writers of this age of Geology. The *professed object* of his elaborate treatise, is, "to trace the "*Elements of Geognostic Philosophy,* as far as regards "the study of the *superposition of rocks*[1]." His work, he states, "includes nearly the whole of *positive geognosy,*" (as opposed to "*hypothetic geology*"); and "he endeavours, at the same time that he presents the *detail of "the phenomena* of the superposition, or tabular arrangement[2], of formations, to *generalise* the ideas respecting "them with the *great questions in Natural Philosophy*[3]." —"*Positive* or *True geognosy,* (he says,) ought to present "a chain of *facts well observed,* and judiciously compared "together:—it describes the exterior crust of our globe "*such as it exists in our days.*—This science, (he continues,) has no less *certainty* than the physical *descriptive sciences* in general[4]." By means of it, "the "*order of superposition,* and the relative *age of rocks,* are "facts susceptible of being determined, like the *structure "of a plant:* on the contrary, whatever relates to the

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[1] Page 42. [2] Page 8. [3] Pref. p. v. vi. [4] Page 6.

"ancient state of our planet; to those fluids which, it is "said, held all mineral substances in solution; to those "*seas which have covered the summits of the Cordilleras,* "*and have afterwards disappeared;* is as *uncertain,* as the "formation of the atmosphere of the planets, as the "various migrations of plants, or the origin of the different "varieties of our species. Yet, the time is not very "remote, (he adds,) when geologists were occupied from "choice in the solution of these problems, and with this "*fabulous period* of the physical history of the earth[1]."—"The *new doctrine of geogony,* (he says,) has a tendency "to lean towards the *idea* of the liquefied masses ascending "across the fissures *from below upwards,* whilst the *ancient* "*geogony* (i. e. that of Werner, propounded four years "before by M. D'Aubuisson, and maintained by M. Humboldt himself in 1804[2],) explained every thing by precipitations and movements *in an opposite direction:* "positive geogony has *profited* by these discussions on "the *igneous* or *neptunian* origin of rocks; but it renders "the classification independent of *geogonic results*[3]."—"I must confess, (he proceeds,) that these classifications, according to the various *hypotheses which we* "*form on the origin of things,* appear to me not only "vague and arbitrary, but also very injurious to the "progress of a *geognosy of position;* they prejudge in too "arbitrary and absolute a manner, what is at least extremely doubtful[4]."—"When the geognost has examined "the relations of *position* and *composition,* he has *fulfilled* "*his task*[5]."

Here then we have, at last, a writer on geology *altogether practical;* who condemns, in the most express and in the strongest manner, every thing that is *theoretical* or

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[1] Page 5, 6. [2] See above, p. 10, *note.* [3] Page 414.
[4] Page 406, 7. [5] Page 173.

hypothetical in discussions on the *structure of the earth*: His "geognosy" is only "a *descriptive science*" of the crust of our globe, *as it now exists;* not as it "*may be* "*supposed to have been*[1]." The simple and actual *matter of fact*, is, avowedly, the exclusive object of his consideration and instruction; which is presented to our view under the compendious form, of *a Tabular arrangement of formations observed in both Hemispheres.* "Although in "the course of a laborious life, (says this indefatigable "scrutinator,) I have had the pleasure of seeing a greater "extent of mountains than any other geognost, the little "I observed is lost in the great mass of *facts* which I "have undertaken to display. What is most important "in this *treatise on formations*, is derived from the com-"bined efforts of my contemporaries. I wished to present "to my readers, in a concise manner, *the whole of the* "*discoveries* that have been made; *and I thought I* MIGHT "ADD *what is* ONLY PROBABLE, *to what appears to me* "*completely verified.* If I have attained the end pro-"posed, the distinguished men, who, in Germany, "France, England, Sweden, and Italy, have contributed "to enlarge the edifice of *geognostic science*, will recognise "in every page the results of their own labours[2]."

Yet, notwithstanding this emphatic disclaimer of all *hypothesis*, notwithstanding this determined advocacy of *facts*, and *facts only*, the "*Geognostical Essay*" is governed throughout by a *masked theory;* of which its eminent author appears to be hardly conscious, but of which the attentive reader will have caught some surmise from the *reservation* claimed by the author; "of *adding* what is "*only probable*, (that is, in his own opinion) to what ap-"pears *completely verified*," and thus, of *incorporating theory with the facts of his observation and experience.*

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[1] Introd. p. 1.

[2] Page 76.

This *theory of probabilities*, I shall now proceed to unmask; in order that we may be able to distinguish and ascertain exactly, how far his *geognosy of fact* is also a *geognosy of hypothesis*, and thus reveals itself to be only another variety of that *Alchymical Geology*, which has already been examined and exposed.

It is not possible for any human mind, and especially for one so active and searching as M. Humboldt's, to be busily and earnestly engaged in contemplating the *materials* of the crust of this globe, their *position* and *composition*, without secretly viewing them under their relation of *effects*; and, however determined it may be to confine its attention to them as *effects only*, yet such is the moral construction of the intellect, that it cannot restrain itself from looking *from them to the causes*, and from an endeavour to *restore the relation between the two*. If those causes are *known* and *manifest*, it will naturally resort to them for *guidance*, and will rest on them for its *own relief*; if they are *unknown*, or *latent*, it will then strive to procure for itself the same relief, by *assuming such others as appear to it the most probable*. So it has happened with our celebrated geognost. He has rested, in his geognostic labours, on certain causes which he *assumed as most probable*, and (to use his own phrase,) " as *points of* " *repose for the mind*[1];" by, and in reference to which causes, he has exposed all his practical observations on the exterior crust of the globe. Those *assumed causes* constitute *his theory*, (a phrase, which may perhaps sound very strange to his ears;) and they are these:

" Having *profited* by the discussions on the *igneous* " and *neptunian* origin of rocks, M. Humboldt *does not* " *hesitate* to range himself on the side of those geognosts, " who *rather conceive the formation* of crystalline siliceous

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[1] Page 30.

" (i. e. *primitive*) rocks by *fire*, than by an *aqueous solu-*
" *tion*[1]:" thus taking his post, at the outset, on the *vulcanian* side, in the *historical question of the* MODE *of primitive formations*. Hence he intimates, that, " in the
" *first period of the world*, the crust of the globe, *strongly*
" *heated in its interior*, became fissured, and gave a high
" temperature to the circumambient air; independently of
" a distribution of climates similar to those of the present
" time[2]—*perhaps, anterior to the existence of a diversity*
" *of climates*[3]." Here, the absorbed geognost is suddenly and unconsciously borne away into a contemplation of that "*fabulous period of the physical history of the earth*," which he condemns in all other geognostical writers, but which is nevertheless essentially inseparable from his own *geognosy*.

But, though he does not hesitate to ascribe the *formation* of the primitive siliceous rocks to *igneous* action, and though he speaks of the *pretended neptunian* origin of some rocks[4], " yet, he *does not contest* the ancient
" (*aqueous*) fluidity, or the softness, of the stony beds: a
" phenomenon, which he considers to be *proved* by the
" fossil bodies, by the crystalline aspect of the masses, by
" the rolled pebbles, or the fragments imbedded in the
" transition (or *fragmentary*) and secondary rocks"—all which testify to him " *the bottoms of the basins in which*
" *the stony deposits have been formed*[5]."

Now, " in the long series of rocks (*primitive and second-*
" *ary*), in this assemblage of *monuments of different epochas*,
" M. Humboldt distinguishes, chiefly, *three* very striking
" phenomena; viz. the first dawn of organic life on the
" globe, *the appearance of fragmentary rocks*, and the
" catastrophe which has buried the ancient monocoty-

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[1] Page 408. [2] Page 46. [3] Page 4.
[4] Page 161. [5] Page 67 and 157.

" ledon vegetation. These phenomena, (he says,) *mark* " *the epocha* of the intermediary (*fragmentary*) rocks, and " that of the coal sandstone, *first member of the secondary* " *rocks.*" And yet he adds: " *notwithstanding the im-* " *portance of the phenomena which we have just remarked*— " the rocks of one epocha have always a *prototype* in the " rocks of a preceding epocha, and *every thing denotes the* " *effect of* A CONTINUED DEVELOPMENT[1]."

" The DEVELOPMENT of the order which is found to " exist in the superposition of rocks, forms *the most im-* " *portant part of* GEOGNOSTIC SCIENCE[2].—By the most " minute *oryctognostic* (i. e. mineralogical) examination, " we obtain a *just idea* of the progressive manner in which, " by *interior development*, that is, by *a very slow change* " in the proportions of the elements of the mass, the " *passage takes place* from one rock to another neighbour- " ing rock:—the elements *are developed—augment*— " and by these certain signs geognosts never fail to recog- " nise the proximity of other rocks[3]."

" But, these *passages* are not always *insensible and pro-* " *gressive;* rocks often succeed each other *abruptly*, and in " a distinctly separate manner[4]:—*Nature* seems to favour " the association of heterogeneous rocks, or, to use a figu- " rative expression, *she* delights in those associations in " which alternating rocks exhibit a great *contrast* of crys- " tallisation, mixture, and colour[5].—But, even in this " case, heterogeneous interposed beds indicate geognostic " relation with the superposed beds.—All these pheno- " mena are produced, *we may say*, by *internal develop-* " *ment*, and through a variation *sometimes slow, sometimes* " *very sudden*, in the constituent parts of an heterogeneous " mass."

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[1] Page 382.
[2] Page 5.
[3] Page 12, 13.
[4] Page 13.
[5] Page 40, 41.

"The order which is followed in the tabular arrange-"ment of formations, is that of *place*, and the *respective* "*position* of the rocks.—I have been *guided by the idea* "of the relative *age of rocks*, in this very imperfect "labour[1]."

Such is M. Humboldt's general *Theory of rocks;* which he thinks he may "*add as probable*," to his tabular arrangement of "*verified observations*."

Now, the reader will in all likelihood have felt himself disposed to question this *theory*, through the hesitation which will have arisen in his mind; 1. from the doubt, whether any such "*interior development*" be really provided in the structure, and for the tabular arrangement, of the rocks constituting the crust of our globe: 2. from an immediate sense of the utter irreconcilableness of such a *systematic development* throughout the series, with the irrefragable testimony presented by the historical monuments of "*epochas, convulsions, revolutions,* and *catas-*"*trophes;*" which the author himself points out, or to which he accidentally adverts. Let us therefore consider each of these points.

1. M. Humboldt, formally disclaiming all reference to a "*Primary Cause of phenomena*" in geognosy, and therefore "*stopping at laws*[2]," propounds, as the universal *law of minerals*, that all rocks were, at first, "an *amorphous* "*paste* or *mass*, the crystalline elements or molecules of "which, though *invisible to the eye*, are *found increased* "and disengaged from the close texture of the mass, and "*by degrees become* beds of considerable thickness.—By "a *very slow change* the passage takes place from one "rock to another neighbouring rock. The *schists of tran-*"*sition*, of which the structure seems at first sight so dif-"ferent from that of *porphyry* or *granite*, present to the

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[1] Page 8.

[2] Page 74. See above, p. 129, 130.

" *attentive observer* striking examples of *insensible passages* " to rocks that are granular, porphyritic, or granitoid. *At* " *first* these schists become greenish, and harder; *in* " *proportion as the amorphous paste acquires* horn-" blende, it *passes* to those amphibolic trap rocks that " were formerly mistaken for basalt. In other places, the " mica *concealed at first in the amorphous mass,* is *deve-* " *loped,* and separates into plates distinctly crystallised; " at the same time, the feldspar and quartz *become visible,* " and the mass *assumes* a granular appearance, with " elongated grains; this is a true transition gneiss. The " grains *lose by degrees* their common direction; the crys-" tals are grouped around their several centres, and the " rock *becomes* a granite or a transition syenite. In other " cases, the quartz alone is *developed, augments,* becomes " formed into round nodules; and, the schist *passes* to a " grauwacke, very distinctly characterised[1]."

But, this principle of *development,* is not restricted by M. Humboldt to *mineral* first formations; it is, with him, an *universal principle,* common to *all* first formations of this earth. He equally designates these, in the other two kingdoms—" the *development* of organised beings[2]—of " organic life[3]—of vegetable and animal life;" and asks, whether " the distribution of organised fossil bodies indi-" cate a *progressive development of vegetable and animal* " *life on the globe*[4]?" and, " stopping his contemplation at " the knowledge of *laws,*" under his professed " ignorance " of the *Primary Cause of phenomena,*" he assumes *development* as the first and most general principle of all physical existences, in all the three kingdoms of terrestrial matter. By which assumption, he virtually asserts a general analogy of *physical operation,* between the first formation, progressive growth, and successive generation of animals and vegetables, and the first formation, progressive mutation, and successive conversion of amorphous mineral masses into perfectly crystallised rocks.

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[1] Page 12—14.
[2] Page 28.
[3] Page 30.
[4] Page 46.

Now, in this application of his new principle to the *mineral* masses of the globe, I would ask this celebrated writer, whether I am reading *positive geognosy* or *hypothetical geogony?* On the face of the exposition, I discern only evidence of that *geological alchymy* which characterises the mineral geology of first formations: of that *unconscious confusion of hypothesis with phenomena*—*of assumed probabilities with verified observations*—which I have already pointed out as *characteristic* in the *geological facts of the mineral geology*[1]. Thus, he says,—"I have "dwelt chiefly on the phenomena of *alternation*—and on "those (phenomena) which result from the *passage* of "one formation to another *in consequence of internal development*[2]"—evidently insensible, that he is here identifying his own *fanciful assignment of a cause*, with the *description of the sensible effect* which he is observing; for he adds, with an unconscious simplicity, "these are *not* "*mere theoretical speculations.*" If our great geognost should affirm, that in thus asserting *internal development* he speaks of *positive fact*, and not *by hypothesis;* I shall request him to direct me to the *fact*, of a rock in *actual course of development from an amorphous to a perfectly crystallised state.* If he only shews me a certain succession of characters and appearances in the mass of a formation, and tells me, that those appearances testify that the formation is *actually undergoing* a course of internal development, which *will eventually*, though "*very slowly and* "*insensibly,*" effect a "*change* in the proportion of the

[1] See above, p. 86, 90.

[2] Introd. p. vi.

"elements of the mass;" (and his proposition declares itself at once to be essentially *hypothetical* and *chimerical,* if he does not so intend it as a *fact;*) I shall deny that he shews me the *fact* which he pretends, but that he only affixes an *imaginary interpretation* on the phenomena of the substance which he exhibits to me. He might as well shew me a brick partially burnt, and tell me, that it is "*in course of interior development* to perfect brick." The *fact* which he must *shew,* is *actual progress.* He must produce a sample of his *primitive amorphous paste;* of which he does not appear to have discovered a single specimen, although he represents its elements to exist in many stages of imperfect formation. We must "*find* the invisible molecule *become visible,* "*and increased;*" it must "augment," *experimentally and sensibly.* If the progress is actually "insensible," like that of the hour hand of a clock, or the growth of a tree, it will assuredly become sensible relatively, in shorter or longer measures of time; but, I must take leave to affirm, without a fear of rational contradiction, that the *only rational evidence* of progressive growth or change, is *experience* of that growth or change. When we see *a tree* in mature vigour, we cannot doubt that it has undergone progressive growth and development, because we have universal *experience* of the progressive growth and development of *trees;* and, when we shall *once* have had *experience* of the *progressive growth and development of a rock,* we cannot fail to admit it of *other rocks;* but, until then, it would be an outrage to reason and common sense to admit it. But, it will be said; the progress is so *extremely slow* that we cannot witness it. Be it so; but then it only remains, that what cannot be witnessed by an *individual man,* must be witnessed by a course of *succeeding generations of men.* A rock or formation must be *marked,* and consigned to the next generation; each must *mark* it, when it consigns it to the next. If, in a series of generations, there is *no change,* then the alleged progress is demonstrated to be purely imaginary; if a change at length declares itself, then *a future generation may begin to take the benefit of M. Humboldt's new principle;* but, until the arrival of that period, the *internal progressive development of rocks* is a doctrine totally inadmissible in *true philosophy,* being substantiated by no shadow of competent evidence whatsoever. I shall illustrate this reasoning, by a fact drawn from the history of another province of Natural Philosophy.

When Newton, in unfolding his *System of the Universe,* came to consider the nature of *Comets,* he stated three different hypotheses which had been proposed respecting them: 1. That they are produced, and perish, as often as they appear, and disappear. 2. That they come from the regions of the fixed stars, and pass away beyond our planetary system. 3. That they revolve perpetually round the sun, in very eccentric orbits. "So far as I "have been able to form a judgment, (said he,) the last "hypothesis is true[1]." And he added: "If *very many* "*Comets are found* to have described the same orbit *after* "*equal intervals of time,* we ought *then* to conclude, that "they are all one and the same Comet:—but, the periodical "times of their revolutions, I LEAVE *to be determined by a* "*comparison of Comets returning, in the same orbits, after* "*long intervals of time:*—Si *plures Cometæ, post æqualia* "*temporum intervalla,* eundem orbem descripsisse *reperiantur,* concludendum *erit* hos omnes esse unum et eundem Cometam[2]:—revolutionum verò *tempora periodica,* "ex collatione Cometarum in iisdem orbibus, *post longa temporum intervalla,* redeuntium, *determinanda* LINQUO[3]."

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[1] *De Mundi Systemate,* § 72. [2] *Princip. Math.* Prop. 42. Prob. 22.
[3] Ibid. Prop. 41. Prob. 21, in fine.

The *idea* of calculating the *revolutions* of Comets, and by that means of *presaging their returns,* struck with a fascinating delight the whole school of Astronomy: so justly has M. D'Aubuisson observed, "such is the *march* "of the human mind, that we throng round any *novelty*; "and, on some slight appearances, some very remote correspondencies, we overturn the ancient edifice, and "hasten to establish a new order of things[1]." A new and inspiring field of *sidereal speculation,* appeared to be suddenly thrown open. To "*leave*" the exercise of that field to the *remote results*—the recurrent "*equal intervals of* "*time*"—to which the wisdom and caution of Newton referred for evidence, was a thought afflictive, nay, intolerable, to the impatience of the existing generation, which could never hope to reap the fruits of them; and it was therefore determined, to *set about calculating at once.* A very equivocal appearance of success in the presaging attempt of the celebrated Dr. Halley, was embraced, for a long time, as a realisation of the sanguine expectations of the astronomers; but, during the progress of the century which followed that in which those expectations were first raised, they gradually died away, and it is now acknowledged by the first astronomers, and can no longer be concealed, that the *returns of Comets* are not a whit more in our power to predict, than they were before the age of Newton.

It is the same with the "*progressive development of* "*rocks,*" propounded by M. Humboldt. Until, (to use his own words on another occasion) it is "*confirmed by* "*future researches*[2];" until a *graduated rock,* taken as a rule, shall have been observed to *have actually advanced,* by the process which he conjectures, from one degree on the scale to another; *reason* will never concede to him his

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[1] Tom. ii. p. 198.

[2] *Superpos. of Rocks,* p. 341.

novel doctrine, but will ascribe the *phenomena* which have given rise to his inventive principle, either to primitive *creative formation,* or to the *powerful but unknown action,* the *various and partial operation,* and the *sudden suspension and cessation,* of the agencies called by their Author into energy during the *authenticated revolutions of His globe;* which *phenomena* remain as they were *at first left,* and we have every reason to believe that they will *continue the same* during the sequel of ages. To one or other of these inscrutable agencies, it will not hesitate to ascribe all those "frequent "alternations, of strata *obviously aggregated,* and strata "*almost homogeneous* or *slightly nodular,* as well as the "*passage* of these masses to each other; which M. Bon-"nard rightly pronounced, to be *one of the most incom-"prehensible of the phenomena which we meet with in the "study of geognosy*[1]."

There are many other points of view, in which this doctrine of *internal development* might be contemplated; but, which the compass of this Note will not permit me to pursue. It might be considered, for example, that this principle, rendered common to the *three kingdoms,* destroys the distinction between *organised* and *unorganised* matter; by gratuitously introducing into the mineral kingdom a principle of *occult organisation,* of "*Cryptogenaa—em-"bryones quorum primordia ignota*[2]." But, I shall rather proceed to examine the second head of our inquiry, *viz.* the *consistency of that principle* with the *testimony* exhibited by *unquestionable monuments, of revolutionary, fragmentary, and sedimentary epochas.*

2. M. Humboldt affirms, "that his doctrine of *con-"tinued development* is denoted by every thing, *notwith-*

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[1] *Superpos. of Rocks,* p. 144.

[2] "*Synopsis Systematis Regni Animalis, nunc primum ex ovi modifi-"cationibus propositum.*"

"*standing* the importance of the phenomena pointing out "*three distinguishable epochas,*" one of which is "the "*epocha of fragmentary rocks;*" of which rocks he tells us, that "the *red sandstone* is generally composed of the "*fragments of the rocks which exist in the neighbouring* "*mountains*[1]." And "Werner," he further tells us, "in "creating geognostic science, has perceived, with an "admirable sagacity, all the relations under which we "should view the *independence* of the *primitive, transition* "(or fragmentary), and *secondary* formations[2]." Now, although he thus draws our attention to the *fragmentary monuments* which exist intermediately in the series of superposed rocks; although he attributes an *igneous* origin to the *siliceous* or primitive rocks *below the fragmentary*, and admits an *aqueous* origin of the *calcareous* and other secondary rocks *above the fragmentary;* yet, he condemns all *historical inquiry* concerning the *modes* of the formation of those three amazing diversities of rocks; calling it "an *hypothesis*, which appears to him *very injurious to* "*the geognosy of position.*"

But, when he has once drawn our contemplation to *fragmentary rocks*, as constituting a line of *demarcation*[3] and *transition* between the *inferior siliceous* and the *superior arenaceous and calcareous;* and, when he points out the opposite evidences, of *igneous* action in the former, and of *aqueous* action in the latter; how can he imagine it to be possible, that the mind should not *first* apply itself to the consideration of the *monuments* thus forced upon its notice; or, how can he expect, that it should concern itself at all with the *accident of superposition*, until it has satisfied itself with respect to the previous important *historical question*, of the *causes* of those general *divisions* and *diversities?* He, indeed, puts the question—"if the "superposition of different heterogeneous rocky masses "exhibits to us the successive order of their formation, "why should we not *be interested* in knowing the state of "organic nature at the different *epochas* when those "deposits were formed[1]?" nevertheless he affirms, that although "the classification of formations *marks the great "epochas of nature*"—yet, that "the *formations* are much "more important than the *great divisions*[2] *which mark "those epochas.*" This may be true *geognostically;* but, *historically, morally,* and therefore *philosophically,* it is most certainly not so. He has called upon us, to *separate* in our thoughts the *upper* and *lower* parts of the series; to refer them to *different causes,* and *different epochas of nature;* and to search for the *event* which occasioned the fragmentary portion *intermediate between the two:* and yet, he would immediately beckon us off from these important objects, and require us to admit, that they are all produced by the "*continued operation of an internal development.*"

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[1] Page 269.

[2] Page 80.

[3] "Sometimes a whole system of granites, gneiss, and syenites "appears again amidst the transition (*fragmentary*) formations, and "*separates the grauwackes and limestone with orthoceratites, from the* "*primitive homonymous system.*" P. 27.

But, the nature of the *intellect*, and the laws of *reason*, positively refuse such a compliance. In these *great divisions of the series,* we are irresistibly led to contemplate generally—first, the *lower division,* consisting of those rocks which are with good reason called *primitive*. The formation of these, M. Humboldt does not hesitate to ascribe to the principle of *fire,* and Werner to that of *water*. We have thoroughly ascertained, that these *antagonist opinions* are the consequence of their assertors not having ascended sufficiently high to find a *prior,* i. e. a *primary principle* or *cause,* common to *all phenomena in*

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[1] Page 54.

[2] Page 30.

first formations, whether apparently igneous or aqueous. That *prior principle,* we have found; and we are assured, that *first formations,* in every part of what we term *nature,* must have been formed by *Intelligent Creation;* and, the *intelligent end* and *design* of those first formations in the mineral kingdom being *solidity* and *durability,* we are assured, *that they received their crystalline consolidation when they were first formed,* or *created, as the most perfect means for attaining that end.*

With respect to the *fragmentary rocks* superposed upon these inferior formations, and consisting of the same in a state of *extensive ruin, decomposition,* or *mutation,* and which, according to the just remark of M. D'Aubuisson, " pertain to an *epocha* when a *revolution* took place in " nature, which, from the numerous indications that we " witness, is perhaps the *most violent* of all those which " occurred during the formation of the mineral shell of " the globe;" it is evident, that we are to look to the mechanical and chemical action of some *disruptive secondary cause, operating in correspondence to the natures originally ordained and provided for the mineral kingdom;* and, thus only can be rationally explained the fact remarked by M. Humboldt, that " the rocks of one epocha " have always some *prototype* in the rocks of a *preceding* " *epocha.*" And, with respect to the *sedimentary* formations above the fragmentary, it is equally evident, that we are to look to a mechanical *aqueous secondary cause;* yet, not without the co-operation of chemical principles.

If we inquire for the disruptive mechanical cause that signalised the " epocha of the *fragmentary rocks,*" and whose chemical operation may be traced in the intermediary or transition formations, we are presently led, by our knowledge and experience, to contemplate *universal volcanic action* as the physical cause of these phenomena. Of the operation of this cause in the fracture of the primitive crust of the globe, in the *first authenticated revolution,* we have already obtained strong *moral* evidence[1]; and M. Humboldt's geognosy adds to that evidence very powerful *physical* testimony, when he observes, that "the transition formation consists of rocks which "exhibit in their composition a *great analogy* with "those of the *primitive formation,* but which alternate "with *brecciated* or *arenaceous,* that is, *aggregated* "*clastic or fragmentary rocks of transport*[2]:"—and, that "trachytic or *volcanic* rocks are *principally situated in* "*the transition (or fragmentary) formation*—above all, "in the formation which *immediately covers the primitive* "*rocks*[3];" and, when he further observes—"It is very "remarkable, to see *sulphur,* gold, mercury, and specular "iron ore, *connected* in South America with those *masses* "*of silex.* Whatever interest the precious metals may "excite, it cannot be denied, *that the abundance of* "*sulphur in primitive formations is, with respect to the* "*study of volcanoes, and those rocks through which the* "*subterraneous fires pierce their way, a far more im*"*portant phenomenon than the abundance of gold*[4]."

But, this cause of mineral *ruin* or *mutation,* cannot have any thing in common with the cause of mineral *first formation;* nor can the superposition of fragmentary and brecciated rocks upon a solid and continuous primitive base, be distorted, by any sophistry, into an *effect of progressive continued development.*

Again; with respect to the mechanical and chemical action of the *water* which formed the upper sedimentary portion of the series, this can have nothing in common, either with the alleged *chemical igneous cause* to which M. Humboldt ascribes the *primitive base,* nor with the

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[1] See above, p. 183.

[2] Page 129.

[3] Page 418.

[4] Page 120.

convulsive volcanic cause which produced the fragmentary and intermediary portion.

Here, then, the phenomena of siliceous or *primitive*, of fragmentary or *intermediary*, of sedimentary or *secondary* formations, compel the reason to search for *three* different, successive, universal causes, capable of operating those *three* universal diversities of effect.

And yet, "*notwithstanding the importance of the phenomena*" testifying these several *epochas*, notwithstanding this diversity of causes and periods deducible from M. Humboldt's own statements, the "*Geognostical Essay*" is conducted without any *historical* reference to them; and, as if no account were to be taken of them in a "*geognosy of position*," which is to consider the whole heterogeneous series as the product of a "*continued development*." Hence, where he notices the *bare granitic mountains* of the Scandinavian peninsula, &c., which Mr. Parkinson well describes as "the primitive surface broken up, and *extensive tracts entirely removed even to the solid granite*, by the inconceivable agencies of Divine power[1]," he considers the absence of all *secondary formations* above them, only as a certain evidence of an "*inequality of development of those formations*[2]." He might, with equal reason, consider the *baldness of an aged head*, as evidence of an *unequal development of hair*. The laborious geognost, "*seeing more mountains* than any other geognost[3]," lost in the multitudinous *details* of their formations, unfurnished with any succours from *history*, and regarding *his own deficiency in history* as evidence of the *deficiency of history itself*, looks upon all historical testimony as "*fabulous;*" and is therefore driven to the desperate necessity, of striving to determine all the facts of his observation *without it.* Indeed, his geognosy seems to wish to erase the *monuments of diversity* from the mind, as soon as it has pointed them out to its notice; and, to *dovetail* the discordant parts of the series into the appearance of a *simple unity.* Much in the manner of MM. Cuvier and Brogniart, whom he adduces; who "have not "hesitated to consider the whole of the marls of the basin "of Paris, with the (assumed) *marine* and *fresh-water* "gypsum, as the *same formation*"—nay, "as *one of the* "*clearest examples of what should be understood by the word* "*formation*[1]," although they admit this *one formation* to have been formed at *different periods*—by very *opposite causes,* viz. by *three* distinct and distant alternations of *sea-water* and *fresh-water* inundations[2]; and M. Humboldt affirms, that they "cannot be *geognostically* divided[3]." Certainly, if MM. Cuvier's and Brogniart's alternating and counteracting inundations of *sea* and *fresh-water* can produce an *unity of formation,* M. Humboldt's *igneous, fragmentary,* and *aqueous* revolutions and catastrophes might do the same; yet, I think that neither will be admitted in philosophy, unless by "*a tacit convention*[4]" among mineral geologists. As the evidence of *unity of formation* in the marls of the basin of Paris, must disprove the *multiplicity* of adverse and counteracting causes to whose co-operation MM. Cuvier and Brogniart would ascribe that unity; so the evidence of *diversity and disparity of formation* in the great divisions of the tabular arrangement of rocks, must disprove the *unity of operation,* namely, *development,* to which the theory of M. Humboldt would attribute it.

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[1] Parkinson, *Foss. Org. Remains*, p. 254.

[2] *Sup. of Rocks*, p. 261.

[3] See above, p. 50, 51.

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[1] This *resolute enforcement,* is evidently introduced with a view to preclude or silence the *obvious objection,* which I am here so adventurous as to advance.

[2] See Note [IV.], *On the Numerous Revolutions of M. Cuvier.*

[3] *Superpos. of Rocks,* p. 62. [4] Page 36.

The "*tabular arrangement*" may, indeed, be considered as constituting an *unity of structure*, as any other compound heterogeneous pile may be viewed as *one body*. Thus, if the dome and roof of St. Paul's cathedral were to fall in, and if, without repairing the fractured part, a roof of thatch were to be thrown across, the whole might still be considered as *one structure;* but, who would not notice, with attention, the diversity and disparity of the parts, and inquire, with diligent earnestness, for the *causes* of the differences which he witnesses? Skill in *architecture*, alone, would not enable him to discover those *causes;* because, they had existence in *facts*, which it pertains to *history alone* to disclose. It is the same, with the *tabular series* of rocks of M. Humboldt; it exhibits, generally, a *solid granitoid base and structure*, whose summit has become *fragmentary* from some violently destructive cause; and it shews that *fragmentary summit* to be surmounted by calcareous and arenaceous accumulations, attesting, by innumerable evidences, that they once formed a *soft aqueous paste*, and have acquired their present consolidation and induration only by the processes of *drainage and desiccation*. We may, indeed, "*without advancing* "*further*," (like our geognost,) contemplate this *compound mass* as an *unity*, if we please, and we may call it *positive geognosy;* as we may so contemplate the *thatched cathedral*, and talk of its *positive*, that is, *actual architecture;* but, our contemplation will be of very little benefit to us, if it does not divide and distribute itself into separate and distinct contemplations; in the one case, of the *thatch*, the *fracture*, and the *undisturbed structure of masonry beneath*, and, in the other case, of the *sediment*, the *fracture*, and the *undisturbed siliceous structure beneath;* so as to search for the *particular causes* of each. *History alone* is able to reveal these, in either case.

But, M. Humboldt renounces all aid of *history*. He labours to discover the *facts*, by principles of *mineralogy only;* which is the same as if the *architect*, in the case supposed, were to attempt to discover them, by principles of *architecture only*. It is no wonder then, that he finds himself so extremely perplexed by the disparity of *primitive* and *fragmentary* formations. "The *terms* of the "geognostic series," he says, "are *simple* or *complex*— "in the *primitive* formations, the terms of the series are "*generally simple;* in *transition* formations, they are *all* "*complex;* and from this *complicated nature arises the* "*difficulty of studying, step by step, an edifice, of which* "*we can with difficulty comprehend the order amidst a* "*confusion of similar parts*[1]." Yet, under this *avowed difficulty*, his *positive geognosy* is anxious to render itself entirely independent, not only of "*geogonic*," but also, of *historic results;* which is, in effect, no less than an anxiety to dethrone *reason*, in order to render *imagination* supreme and dominant in the mind. To accomplish this, he resorts to his paradox of an *internal development*, effecting, by a *very slow change* in the elements of rocks, all the diversities we witness in their tabular series. But, presently, his hypothesis is embarrassed by the *fragmentary* testimonies; and, what then does he do? In two pages, his "*very slow change*" is compelled to change itself into "a "variation sometimes slow, *sometimes very sudden*[2];" and he is obliged to assert a great capriciousness in *Nature*[3], in order to skreen that of *his own Theory*. He has a very singular argument, with respect to what is properly *historical* in *geological investigations*. "In *opposing* volcanic "formations to primary and secondary formations, (says "he,) we agitate a question altogether *historical;* we "oblige the geognost to pronounce, against his will, on "the origin of granites, syenites, and porphyries;"

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[1] Page 38 and 133. [2] Page 12—14. [3] See above, p. 332.

whereas, " in *separating* primitive from secondary " rocks—we *indicate a fact* susceptible of direct obser- " vation; *without advancing further,* and in examining " only the *actual state of things,* we can decide, if an " association of rock *is, or is not,* entirely destitute of " organic remains; or, *whether or not* any arenaceous or " *fragmentary* beds are found interposed[1]." How is it, that M. Humboldt cannot perceive, that the *fact he here indicates* is essentially an *historical fact,* and that its principal importance is " *altogether historical?*" Only because, as he " *stopped at laws*" without ascending to a " *Primary Cause of phenomena,*" so here, he will " *not* " *advance further*" than the presence of the sensible object; but " *stops*" the natural progress of the reason, which sees in it an *historical indication,* of infinitely greater moment and value than any thing he can shew in the *geognostic fact* considered in itself. And, why does he object to the *opposition* of *volcanic* formations to *primitive?* Only because *his theory wants the igneous agent acting in volcanoes, as the universal cause of all primitive formations,* and, as a *principle* to establish an *unity of operation* in his chimerical process of " *continued develop-* " *ment:*" and therefore, *fire* must not be regarded as a *separate* or a *partial,* but as a *common* and *universal principle of formation.* He appears to be affected with a *phobia* of history, as if history were a *vampire* that would destroy all the serenity of his geognostical speculations; and accordingly, after having, in the first part of his " *Essay,*" pronounced " the distinction between the *four* " *great divisions* worthy to be preserved[2];" he insinuates, in the latter part, that it is now to be considered as a " *superannuated custom*[3]." His apology is—" I wished to " *avoid an historical idea* of the origin of things in a

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[1] Page 159. [2] Page 28, 30. [3] Page 407.

"*statistical view of superpositions*[1];" but, he should then have confined himself scrupulously to *statistical statements*, and have *altogether avoided the exposure of historical monuments, of epochas, convulsions, and catastrophes.* Those *four great divisions*, will not submit to any geognostic *superannuation;* being permanently rooted, in deeper ground of evidence than any that mere *mineral geology* can supply.

I think, that enough has been said to shew, that M. Humboldt's "*Geognostical Essay*" has inwoven into itself *a theory* as fanciful, as arbitrary, and as injurious to the attainment of *fundamental Truth*, as any of those which have drawn down upon them his condemnation: yet, it is the most recent and avowed effort of the *Mineral Geology* to supersede the authority of the *Mosaical*[2], which however, by a contrary and unexpected consequence, it pointedly confirms in every stage. Real and attested epochas, must always determine, confirm, or confute, such as are purely imaginary and speculative. That *theory*, therefore, cannot constitute any part of the *positive geognosy* whose elements he professed to teach. Freed from the entanglements of its theory, his *geognosy* reveals itself to be, simply, an *universal topographical and tabular mineralogy*. This, is its *pure one;* in which, its "*internal* "*development*," and its "*igneous formation of primitive* "*rocks*," are only an heterogeneous and debasing *alloy*. Separating these from the former, and thereby obtaining his tabular mineralogy in its *purity* and *simplicity*, we acquire the most extensive and comprehensive accumulation of *observed facts*, respecting the *positive and relative localities of mineral substances*, that science has ever yet possessed; a work, for ever monumental of the enterprise, vigilance, perseverance, and *mineralogical knowledge* of its highly distinguished author; and, for which the "*Hebrew Geology*" is far more indebted to him than he at all suspected.

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[1] Page 34. [2] Page 23, 24; and *Comp. Estimate*, Part III. chap. v.

In examining his " *tabular arrangement*" merely as a *matter of fact*, we are particularly beholden to him for the ingenious and beautiful scheme which he has devised for bringing the whole of it within the easy grasp of the discernment, by his " *pasigraphic* or *algorithmic method* " of indicating the superposition of rocks, as the terms of " a series;—by which we may, by means of *twelve geo-* " *gnostic signs*, exhibit the most important phenomena " of position of the *primitive, intermediary, secondary,* " and *tertiary* (or upper-secondary) *formations*[1]." I shall not withhold this *method* from my reader.

" To designate the *four most ancient primitive forma-* " *tions*, M. Humboldt employs the first four letters of the " Greek alphabet, *α, β, γ, δ*;" these, for a reason which will appear, I shall place in capital characters:

" Α—*granite.*
" Β—*gneiss.*
" Γ—*mica-slate.*
" Δ—*clay-slate.*

For all the remaining formations, he takes the *initial letter* of a Greek word significative of them, respectively. *e. g.*

" ο—(οφις) *serpentine*, and every formation abounding in *diallage.*
" σ—(Συηνη) *syenite*, and every formation abounding in *hornblende.*
" π—(ποϱφυϱα) *porphyry;* which sometimes passes to σ (*syenite*), and sometimes to ο (*serpentine*).
" τ—(τιτανος) *calcareous* formations.
τ —primitive limestone.
τ' —limestone with organic remains.
τ^t —*transition* limestone.

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[1] Page 465—471.

τ^a — *alpine* limestone or zechstein.
τ^m — *muschelkalk* or shell-limestone.
τ^o — *oolitic* or Jura limestone.
τ^c — *chalk.*
τ^p — *Paris* limestone.

" κ — (κλασμα) *clastic* or fragmentary, aggregated, conglomerated, or arenaceous rocks.
κ^g — *grauwake,* or fragmentary transition rocks.
κ^a — red sandstone, containing the great deposite of *anthrax* (coal).
κ^n — *Nebra,* or variegated sandstone.
κ^q — *Quadersandstein,* or sandstone of Königstein.
κ^l — green sandstone *below* chalk, with *lignites.*
κ^{2l} — sandstone *above* chalk, abounding in *lignites.*
κ^f — sandstone of *Fontainebleau.*

" ξ — (ξυλον, *wood*) coal." As this sign prematurely (φ) determines the substance of coal to *terrestrial* vegetation, (see *Comp. Estimate,* Part III. ch. xi.), I would substitute φ (φυτον, *a plant,*) as a more comprehensive sign; and, if the probability should eventually appear to lie on the side of *marine* vegetation, the same sign will equally denote φυκος—*fucus.*

" ϑ — (θαλασσα) rock-*salt.*" M. Humboldt tells us, (α) that he has taken this sign instead of the α of ἁλς, only because he had assigned that character to *granite;* but, by giving the capital letter to granite, the more appropriate α becomes disposable here. I shall therefore adopt the two latter alterations.

To these might be added,

η — (ηφαιστειος) *Vulcanian, volcanic.*
η^b — *basaltic.*
η^t — *trachytic.*

COLUMNAR TABLE.

τ^{p}	*tert.* or *diluv.*
χ^{21}	
· · · · · · · ·	
τ^{c}	*secondary* or *sedimentary.*
χ^{l}	
τ^{o}	
χ^{q}	
τ^{m}	
χ^{n}	
$\alpha+\tau^{a}$	
$\varphi+\chi^{a}\,\pi$	
o	*intermediary* or *fragmentary.*
$\pi\ \sigma$	
$A+\sigma$	
$\pi\ \sigma$	
τ'	
Γ	
$\pi+\Delta$	
Δ	
$\tau'\ \Delta$	
τ'	
χ^{g}	
· · · · · · · ·	
o	*primitive* or *creative.*
Δ	
B	
A	
Δ	
Γ	
A	
$\tau+\Gamma$	
Γ B	
$\pi+B$	
B A	
A	

By means of these signs, M. Humboldt "proposes the principal phenomena "of the position of rocks in the *primitive*, "*intermediary, secondary,* and *tertiary* "formations, in the annexed series:"— and he adds, "as the notation presented may be variously graduated, "by the manner in which the characters are accentuated; in uniting "them as co-efficients in complex formations, or in adding exponents; I doubt "whether the *names of the rocks,* arranged by series at the side of each "other, would address itself as forcibly "to the eye, as the *algorithmic notation.*" To increase the *force* of the representation, I shall here exhibit the series in a *Columnar Table,* as it is situated in the globe; and not in the form of an algebraical series, as it is presented by the ingenious author.

It will be necessary to apprise the reader; that the series thus presented, is not taken from any particular instance, but is only "*proposed*" by the author, as the *general result of his observations;* and therefore, that it is subject to his *reserved claim*—of "*adding* what he thinks *only* "*probable,* to what appears to him completely verified."—"I do not pretend "(he says,) that the situation and position "of the rocks in the tabular arrangement, has been *actually observed* in "every region of the earth; I only state

" them such as appeared to me the *most probable*, " after having compared a great number of facts which " I have collected[1]." It is, therefore, not entirely exempt from the dove-tailing operation of his *theory*. Nevertheless, the *Columnar Table* will not fail to exhibit, " *very " forcibly to the eye*," the FOUR great divisions, diversities, and successions in the disordered edifice of our globe; and to prompt us to scrutinise the *general testimony of the historical monuments*, before we consent to yield any attention to the *details*, either of the *ingredients composing the several parts*, or of the *accident of their relative superposition*. To " *decipher*" those great divisions and their diversities truly and intelligently, is an office that pertains exclusively to the " HEBREW," or MOSAICAL GEOLOGY; which, alone, " *holds the* KEYS[2]" of this sacred ARCANUM.

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[1] Page 8.

[2] See above, p. 8, 10, 11.

END OF THE FIRST VOLUME.

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